ART-STUDIES FROM NATURE,

AS APPLIED TO DESIGN.

ART-STUDIES FROM NATURE,

As applied to Design:

FOR THE USE OF

ARCHITECTS, DESIGNERS, AND MANUFACTURERS.

COMPRISED IN FOUR PAPERS BY

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PREFACE.

ATURE may be studied in many aspects; her wealth of service and beauty is freely open to all who seek; and while the man of science, by patient study and assiduous toil, may learn something of her mystery, and gather from her not unwilling hands rich treasure of knowledge for the benefit of humanity (for without the midnight watch and the elaborate calculation of the astronomer navigation would yet be in its infancy; without the enthusiasm of the botanist as he toils in the tropic forest the virtues of many a healing plant would be unknown; without the keen perception of the geologist the miner's task would be in vain), so the man of art in no less degree may find in her study richest elements of beauty, loveliest suggestions of colour, forms of infinite grace. A delight in the study of Nature, a desire to realise something of its grandeur, is a source of unbounded pleasure to its possessor, for to him no walk can be a weariness, no season of the year dreary, no soil so sterile as to be barren of interest:—

> "The meanest flow'ret of the vale,
> The simplest note that swells the gale,
> The common sun, the air, the skies,
> To him are opening Paradise."

The lichen on the rock, the wayside grass, the many-coloured fungi, are no less full of beauty than the forms that more ordinarily attract attention, and are no less worthy of study. "The works of the Lord are great, sought out of all them that have pleasure therein;" and Nature has ever to the devout mind, from its own inherent beauty and its testimony to Him its creator and sustainer, been a study of the deepest interest. Some who glance over these opening remarks before entering upon the search for such material in the body of the book as may seem available for their immediate purpose, may consider that this view of the subject is unpractical; but we would remind such that all art, pictorial, sculptural, decorative, or what not, is only noble and worthy of the name so far as it affords food for thought in the spectator, and testifies to thought in the artist, and that the nobility of the work is in direct proportion to such evidence of inner life. Art that is æsthetic and sensuous, though pleasing to the eye, must ever in the nature of things hold a subordinate place to that art which is symbolic, to those forms in which an inner meaning may be traced; and though one work of art may perhaps necessarily contain less of this reflected thought than another, yet this proposition we think will hold good, that no work of art that does not in some way testify to this can be altogether satisfactory, for while pleasing for a time to the eye, it yet leaves the mind unsatisfied: the reverse will equally hold good, and we may safely repeat that in proportion to the thought bestowed and expressed by the artist will be the enjoyment and profit to be derived by others from it. The true artist will not consider with how small expenditure of trouble he

may attain his end; he will, on the contrary, have a heart full of sympathy with all that is beautiful. This will become a wealth of knowledge, will prove a precious possession to himself, and the result must be visible in his work, and stamp it with Promethean fire. To the artist then who is worthy of the name, nothing can be too petty for regard, nothing that the Creator has pronounced "very good" too insignificant for notice; for in Nature beauty is scattered with a lavish hand, and the fungus that passes through all the stages of its existence during a summer's night, and the snow-flake still more transient in its duration—

"Frail, but a work divine:
Made so fairily well,
So exquisitely minute,
A miracle of design"—

have a charm of their own no less than the higher forms, while to give but one other example from the many that present themselves, the *Foraminifera*—animal remains met with in chalk cliffs—though only visible with high microscopic power, have the curves of their shells as graceful, designs as varied, markings as intricate, as perhaps any other natural objects whatsoever. We therefore appreciate the quaint fancy, the studied thought of the designer who in some old glass that we have noticed at Ockham Church, in Surrey, while making some of his quarry designs of columbine, rose, and other lovely forms, chose for one of them a little fungus surrounded by cup moss, and springing from the turf; frail creatures of a day, meet emblems—like the withering grass, the

fading flower—of the short estate of man, the transience of all his glory.

In the endeavour to suggest something of these humbler types of beauty to the artist, the designer, the architect, and the manufacturer, the following papers have been collected from the pages of the *Art-Journal*, the periodical in which they originally appeared, and after careful revision by their several writers, have been published in this detached form, in order that they may be still more commonly accessible.

The first article is an endeavour on the part of the author to indicate something of the profusion of beautiful form that may be met with in our hedges and skirting our roadsides, to point out the source from whence the mediæval artists gathered their inspiration, and to plead for its greater use by their successors, that by a like loving appreciation we too may create like forms of beauty.

The second essay deals with marine forms of vegetable life, and dwells on the immense variety of form that may be met with in the sea-weeds that surround our shores, and the applicability of many of the species to the varied purposes of the designer. It is curious that these wonderful forms should not have been employed more largely in the decorative work of any people. With the exception of the singularly waved and bossed foliage seen in the stone carving and metal-work of the later years of the Decorated period of Gothic, and which may possibly have been originally suggested by the *Fucus vesiculosus*, one of our commonest shore weeds, we know of no instance of their introduction into orna-

mental art. Hence here at once a wide field is open to the designer, and this essay cannot fail to be full of valuable material.

As the first and second articles have striven to illustrate the beautiful forms that inhabit the land and the sea respectively, so the third article, leaving

"The deep's untrampled floor
With green and purple sea-weeds strewn,"

and the more familiar forms of earth, deals with those delicate forms of the air, the flakes of falling snow, and points out the immense variety of graceful forms afforded by their crystals.

Symmetry and geometry are both so commonly met with in ornamental art, and are also so conspicuously present in the forms of snow crystals, that the application of those forms to design cannot fail to follow when once their beauties are brought under the notice of the designer and manufacturer.

Symmetry shows itself in a general beauty of proportion, and balance of masses in a composition; or, in the more limited sense in which we now use the word, in the likeness of one half or part to another in the unit of design. We speak of a design being bi-symmetrical or tri-symmetrical, or if it goes beyond this, as in snow crystals and in many other cases where the ornament may be bounded by a circle, it is termed multi-symmetrical. Bi-symmetrical arrangements will be found most appropriate for the decoration of upright surfaces, as wall-papers or curtains, which will always be seen one way, while multi-symmetrical star-like forms are more suitable for floor-cloth or carpet patterns, because

a star-like pattern on the floor looks equally well from all parts of the room; while a design having its halves merely alike can only be viewed to advantage from one point. It is curious to observe that in Nature the rule seems to be that the lower forms shall be multi-symmetrical, made up of several similar parts, while the higher forms of life are bi-symmetrical: thus in the first class we get snow crystals, sea-anemones, star-fishes; and in the second, the more advanced forms of animal life—insects, birds, quadrupeds, and man himself. There are numerous exceptions, however, to this: thus we have flowers multi-symmetrical, and their leaves only alike in their halves, though undoubtedly the flower, in view of its functions in vegetable physiology, and also from the ornamentist's stand-point, cannot be considered lower in the scale of creation than the leaf. The charm produced by the mere repetition of parts may be well seen in the kaleidoscope, where a series of irregular pieces of glass develop into various ornamental forms, owing to their symmetrical arrangement and radiation from one centre—an effect still more clearly and beautifully seen in the crystals of snow, where the unit is itself of pleasing form.

The influence of geometry upon design has in almost all periods of art been very marked—in some styles, as the Early English Gothic, and the Italian of the thirteenth century, much more so than in others; but in no style is it altogether ignored. Whether we study the examples of decorative art produced in our midst, the result of modern skill; or turn to the remains of Egyptian and Assyrian ornament, the brain-work and handiwork of men who toiled thousands of years ago, or whether we contrast

the delicacy of much of our English work with the rude carving or pottery of the South Sea Islander, we still cannot fail to notice that amidst much that is very marked and distinctive in comparing one period with another, or the handiwork of one race or nation with another, this one great principle of the adaptation of geometry to ornament is exhibited more or less prominently in all. Where a sense of flatness is desirable, as in designs for floor-coverings—as mosaic, tile-work, carpeting, &c.—the use of geometrical forms appears especially appropriate, since the feeling of flatness is easily obtainable, and yet, accompanying this essential feature, almost any degree of complexity and richness of effect. These remarks upon the use of geometry must, however, be considered to apply more especially to the simpler kinds of design, to those intended to fill but a subordinate place. As we rise higher, geometry, though still valuable in the setting out and defining of leading lines and masses, gives place to higher forms, those based on animal or vegetable life. In a fourteenth-century diaper the part we admire is not the geometric basis of the design, but the delicate filling in of oak or maple, buttercup or ivy, though we unconsciously admire this the more on account of the enclosing straight lines—lines that we should at once miss if they were removed as superfluous.

The fourth essay of our series deals with the suggestive ornamental forms so freely met with in organic remains. As in the previous essay we found in the clouds above forms of beauty well adapted for our needs as ornamentists, so in this one we delve beneath the surface of our earth, and again have the lesson

impressed upon us, that in every situation forms of beauty abound, that the world is full of suggestive material for the student of ornamental art, and that in what at first sight appears a barren and profitless waste, fresh proof is given of the universal reign of law, order, and beauty throughout the whole range of creation. These four essays, then, should prove a welcome addition to the ornamentist's store of material, since (though no book-work can take the place of actual observation) they may at least suggest to him other forms, and cause him to turn his attention in fresh directions. With this hope, then, we conclude, trusting that our efforts thus to illustrate in some degree the wealth of Nature may not have been altogether in vain.

F. E. H.

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I.

THE ADAPTABILITY OF OUR NATIVE PLANTS TO THE PURPOSES OF ORNAMENTAL ART.

By EDWARD HULME, F.L.S., F.S.A.

THE ADAPTABILITY OF OUR NATIVE PLANTS TO THE PURPOSES OF ORNAMENTAL ART.

IN this series of papers it will be our desire to direct the attention of the architect, manufacturer, and designer, to some of the beautiful forms of nature, which, though easily accessible, seem to have scarcely received the consideration they deserve; to give a brief account of the habits, peculiarities, and localities of the plants as they come before us; to cite from time to time examples, either English or foreign, of their use in the ornament of the past; and generally to add such details as may directly or indirectly tend to create an interest in the plant in question. We find, on looking back at the past history and practice of ornamental art, in the midst of many marked differences of style, one principle very generally observed—the use in the ornament of any given country of the plants familiar to the people. Hence, the Egyptians exclusively used in their ornament the plants of their own land; we see the palm branch, the papyrus, and the beautiful lily of the Nile constantly recurring. We find the Greeks and Romans employing the acanthus, olive, and vine; the Japanese, the light and graceful bamboo; and in our own Gothic styles and those of the Continent—French, German, or Spanish—we meet with more or less

conventionalised representations in the carvings, paintings, illuminations, fabrics for dress, hangings, &c., of the familiar forms of our hedgerows, streams, and meadows, such as the wild rose, oak, maple, iris, buttercup, and many others. It is then with the desire to awaken our decorators to the fact, that beautiful as the Greek *anthemion* and other allied forms are, they by no means represent the limit available in ornamental art, that the following papers have been prepared, since we are persuaded that if once the inexhaustible riches of nature were sought after by our architects, and their beauties brought before the eyes of the people in their work, architecture would thus be taking one long step nearer to the sympathies and appreciation of many to whom it is now a matter of indifference. The works of a few of our leading architects owe at least some of their beauty to their recognition of this truth; and we would desire, while acknowledging the services rendered to architecture by such men as Pugin, Collings, Street, and Gilbert Scott, to add our mite to the revival going on around us.

Botany, or the study of plants (Gr. *botane*, a plant), is capable of many subdivisions: thus we have one department which, from its dealing with the vital functions of the plant, we term physiology (Gr. *physis*, nature—*logos*, science); another which, from its more especially dealing with the organization and structure of the plant, is called organography, or structural botany; while a third great division, systematic botany, derives its name from its teaching how the multifarious forms of vegetable life may yet be classified into genera, and these again into orders

and species from certain points of resemblance in the plants thus classed together. Botany, in itself a science in the ordinary use of the term, may, however, render valuable service to art; and it is this phase of the subject which we more especially propose to develop, treating only of the more exclusively scientific points so far as we find them necessary for our present purpose; and in this we think we are fully justified, for though numbers of excellent works are accessible to the student who desires to study botany as a science, but few fully recognise its importance in a modified form to the art-student, and more especially to the designer. To the ornamentist a knowledge of the laws of plant growth is of really the same importance as the study of anatomy to the figure-painter or sculptor, and the absence of this knowledge is to the initiated, in either case, as readily detected. Many who are now content to forego this precise knowledge are no doubt partly debarred by the technicalities which meet them at every sentence in ordinary botanical works. Bearing in mind, therefore, the special requirements of our readers, we shall endeavour to avoid as far as possible the use of terms which, though scientifically valuable, and in fact essential to correct and true description, are not such as we may reasonably assume our readers, without special botanical study, to be familiar with. A knowledge of these terms is, however, very desirable, since their conciseness renders them valuable, and more especially, also, because many excellent works, which it will be of advantage to the student to consult, largely employ them. We trust that in the few cases where such terms are in the present work intro-

duced, a clear explanation of their force and utility will be found to accompany them; we shall also, as a further assistance, add the source from whence the term is derived, wherever the introduction will tend to throw additional light on the meaning of the word.

As we cannot hope, in the limited space at our command, to supply every requirement, give every detail, or bring forward more than a few of the more common plants, the present work must be considered rather as a suggestive list of the more striking plants which, from their ornamental characteristics, will, we trust, be found of service to designers, than an exhaustive catalogue. It is very far indeed from being a complete list.

To render the work as practically useful as possible, we add to each plant mentioned the names of some standard books in which reliable drawings of the plant in question may be found; for though nature should always, if possible, be consulted, it may not at all times be within the power of the student to do so, owing to press of work, the season of the year, and many other disturbing causes.

The following books are thus referred to, the illustrations in them being of a trustworthy character. After the name of each book is the abbreviation used in the present work when it is necessary to quote it:—

The Flora Londinensis of Curtis. First Edition	F. L.
Medical Botany. Woodville. First Edition	M. B.
Medical Botany. Stephenson and Churchill. First Edition	S. C.
Illustrations of Natural Orders of Plants. E. Twining	T. N. O.
English Botany. Sowerby. Third Edition	E. B.

Vegetable World. Figuier	V. W.
School Botany. Lindley	S. B.
Woodlands, Heaths, and Hedges. Coleman	W. H. H.
Grammar of Ornament. Owen Jones	G. O.

The first five on this list have coloured plates. To these we may be allowed to add Plant Form (P. F.), a work prepared by the author for the especial use of designers.

The plants described in the following pages are, to facilitate reference, arranged in regular alphabetical sequence, according to their English names, since most of my readers will more readily recognise a plant by its familiar title than by its botanical appellation. Thousands are familiar with the little daisy who would never recognise it in any description headed *Bellis perennis*. At the same time, we in every case give the scientific nomenclature as well, since in most works you may desire to consult, that will be of greater prominence than the one used colloquially. A difficulty here arises from the fact that several of our English flowers have numerous synonyms given to them; we have, however, chosen the name which we believe to be most commonly used, referring also to the others in the course of our remarks on the plant.

In the introduction of vegetable growth into any ornamental composition, we must be careful to remember that what is wanted is not so much a direct imitation of nature, which after all can only be faulty at the best, as a due adaptation of the natural form to the purpose of our design—a recognition of the impossibility of a close copy of nature, together with a feeling of its undesirableness even if it could be accomplished. Our

representations must therefore be more or less conventional: in a flower-painting we naturally expect to see a direct transcript of nature, while in decorative art a direct transcript offends us.

"In the multitude of counsellors there is safety;" we will, therefore, here quote some few passages from the works of those whom we think we can all agree are entitled to speak with authority and to be heard with respect. Ruskin, in speaking on this subject, says,—"All noble ornamentation is the expression of man's delight in God's work;" and again, "Ornamentation should be natural, that is to say, should in some degree express or adopt the beauty of natural objects; it does not hence follow that it should be an exact imitation of, or endeavour to supersede, God's work; it may consist only in a partial adoption of, and compliance with, the usual forms of natural things, without at all going to the point of imitation, and it is possible that the point of imitation may be closely reached by ornaments which nevertheless are entirely unfit for their place, and are the signs only of a degraded ambition and an ignorant dexterity. Bad decorators err as easily on the side of imitating nature as of forgetting her, and the question of the exact degree in which imitation should be attempted under given circumstances, is one of the most subtle and difficult in the whole range of criticism." Wornum thus defines the difference between naturalism and conventionalism: "A natural treatment implies natural imitation and arrangement, but an ornamental treatment does not necessarily exclude imitation in the parts, as, for instance, a scroll may be composed

of strictly natural parts, but as no plant would grow in an exactly spiral direction, the scroll form constitutes the ornamental or conventional arrangement; we may, however, have conventionalism of details as well as conventionalism of arrangement." Hudson says,—"There is a great difference between the terms applied and adapted; they, in fact, express the wrong and the right use of vegetable forms. All natural forms require certain modifications to adapt them for other than their own natural situations, and it is the neglect of this, and the simple application of these forms without adapting them, which constitute a false principle." Dresser thus illustrates the difference: "Mere imitation is not ornamentation, and is no more art in the higher sense of the term than writing is itself literature. Vegetable nature treated conventionally will not be found to be far removed from truth, but will be merely a natural form, or a series of natural forms, neither marred by blights nor disturbed by winds, adapted to the fulfilment of a special purpose, and suited to a particular position—for the most perfect examples of what is usually termed conventionalised nature are those which express the intention of nature, if we may thus speak, or are manifestations of natural objects as undisturbed by surrounding influences and unmarred by casualties." In the same way we might bring forward passages from the works of Owen Jones, Sir Gardiner Wilkinson, and many others, in illustration of our remarks; enough, however, has, we trust, been brought forward to confirm the position taken up.

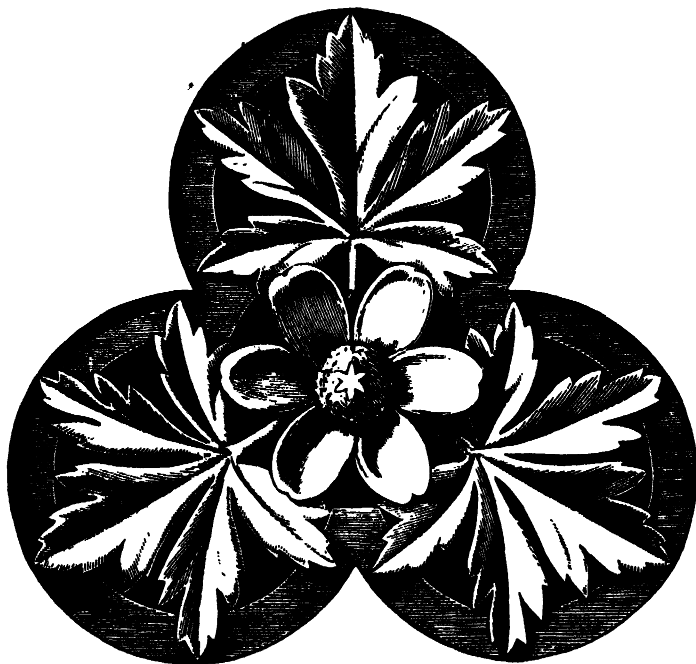
We will now, without further prelude, proceed to the brief

consideration of the few representative plants we have selected for our remarks.

The AGRIMONY. This plant, the *Agrimonia Eupatoria* of botanists, and the Agremoine of old writers, is ordinarily met with in hedgerows and waste places by the roadside. The flowers are bright yellow, and are arranged in what is termed botanically a spike (Lat. *spica*, an ear of corn; when the flowers grow in succession direct from a central stem). The leaves are very ornamental in character, the central line giving off large side leaflets, and the intermediate spaces being filled by smaller ones. The edges of all the leaves are deeply serrate (Lat. *serra*, a saw; notched like the teeth of a saw). Very suitable and suggestive for lace or wall-papers, where a somewhat delicate form with a decidedly upright mode of growth is desirable. Drawings of the plant may be seen in S. B. 126; E. B. 417; F. L. vol. v. 32; and M. B. 258. The natural plant will be found in flower during July and August.

The WHITE or WOOD ANEMONE (*Anemone nemorosa*), or, as it is often termed in old botanical works, the Wind-flower. This older name refers to the same fact alluded to in its generic name, *Anemone*, the fragility and delicacy of the flowers, and their exposure to the bleak and boisterous winds that sweep through the almost leafless woods in early spring, or, as others believe, from an old fancy that the flowers will not open until buffeted by the gales of March, *anemone* being derived from the Greek word, *anemos*, the wind. The second name, *nemorosa*, signifies woody, and bears obvious reference to the localities most favourable to

the growth of the anemone. The plant may be found in flower during the months of March, April, and May, the blossoms being pure white, with a bright yellow centre, and the outer surface of the sepals of a delicate purple tinge. It abounds in moist woods throughout the country, generally in such profusion as to cover



Anemone.

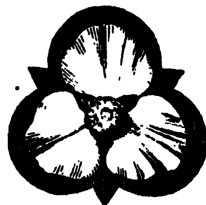
large tracts of ground with a snowy whiteness; and the plant being perennial, we shall, when it is once established in any spot, find it regularly recurring as each spring-time comes round. The manner of growth of the anemone is very distinct and characteristic, and not being subject to any variation, cannot well be

modified in the employment of the plant in ornamental art without destroying its individuality, as from the single stem thrown up from the ground three equal-sized leaves, identical in form, are produced from a point about six inches from the soil, and the stalk is then continued for about the same distance again before bearing at its summit its single flower; each and every plant, therefore, consists of a central stem, a terminal flower, and about midway up the stem a group of three leaves. This rigid law, though extremely beautiful in itself, and admirably adapted for treatment for some ornamental purposes, may, perhaps, somewhat restrict its use in decorative art. We are not aware of any examples of its employment in past art. In our illustration, the plan of the plant, the view with which we are most familiar, as we see it in its natural position, is shown, having the single central flower, and below it the three leaves radiating from the stem. It will be found that this strong individuality of growth more especially adapts itself to the trefoil, or any other form based on the figure three.* The garden-anemone (*A. coronaria*) is an allied species of the same family, modified by cultivation: in its wild state it is a native of the South of Europe.

The ARROW-HEAD (*Sagittaria sagittifolia*), one of our most beautiful aquatic plants, must be so well known to our readers that any lengthened description of it will be superfluous. Its generic, specific, and English names all alike point out its leading characteristic, the beautiful arrow-headed shape of its leaves;—

* For drawings of the anemone see S. B. 87, E. B. 11, and P. F. 66.

sagitta, Lat., an arrow. The calyx and corolla are each composed of three parts, the petals being a brilliant white, with a pale pink irregular blotch at their bases. The forms of the flowers, fruit, and leaves are all equally adapted for decorative purposes, though it does not appear to have received in the past the attention which its merits might very fairly claim, the only instances of its application in ornamental art with which we are acquainted being in a running band of ornament round a tomb, fourteenth century, in the cloisters, Burgos. The flowers are incorrectly represented in that example as having four petals, but the general effect is, nevertheless, very good. See E. B. 1436 and P. F. 72 for drawings of the natural plant.



Arrow-head.

The ARUM (*Arum maculatum*) is a plant of very common occurrence throughout England, though rarely to be found either in Scotland or Ireland. It may be met with in shady groves and thickets, and nestled among the long grass and other herbage upon our hedge-banks. The plant will be found in flower during April and May; but from the mode of growth, and also from the pale green colour of the spathe surrounding the central organs, it is by no means conspicuous among the surrounding foliage. The upper portion of the central body or spadix—that part of it which is seen in our illustration—is generally of a dark crimson colour. The plant is far more likely to attract attention in the autumn and winter than during its season of flowering, as towards the close of the year the leaves of the arum die away, and the hedgerows also being stripped of the greater part of their

foliage, we notice the brilliant scarlet berries of the present plant rising in a dense mass to the height of some three or four inches from the ground. If the fresh root of the plant be tasted, it excites a burning and pricking sensation in the mouth that will remain for several hours; and if sliced and applied to the skin,



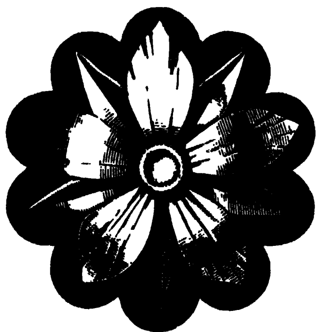
Arum.

it will frequently produce blisters. This virulence, however, like the acrimonious principle met with in the leaves, yields to the influence of heat, and in former times an excellent starch was prepared from the root. In the writings of the old medical authors and poets we meet with the wild arum under a great variety of

names, many of them, through the lapse of time and from disuse, being now meaningless to us; such, for example, as abron, janus, barba-aron, calf's-foot, ramp, and wake-robin. A very common name for the plant at the present day with country children is lords-and-ladies; and an equally familiar name, both with children and also in descriptions of the plant in botanical works, is the cuckoo-pint: this may possibly allude to the slight resemblance of the enclosing spathe to a measure for liquids. Another old name for the plant is the starchwort, in obvious allusion to its domestic use. Like most other plants, it was held by the medical practitioners of the Middle Ages to possess very considerable and valuable remedial qualities. A small portion of the leaf, either dried or in the green state, was esteemed a sure remedy for the plague or any poison. "The water wherein the root hath been boiled, dropped into the eyes, cleanseth them from any film or mists which begin to hinder the sight," or under circumstances to which the writer delicately hints, "when, by some chance, they become black and blue." Though the bold, simple forms of the flower and bud and the rich arrow-headed shape of the leaves appear, in an especial manner, to fit it for valuable service in ornamental art, it has been but very rarely thus employed. Illustrations of the natural growth of the plant will be found in F. L. vol. ii. 63; S. C. *22*; and P. F. 41.

The AVENS (*Geum urbanum*), belonging to the same natural order, *Rosaceæ*, as the tormentil and wood-strawberry, possesses also the same peculiarity of flower, the petals being five in number, while the calyx is composed of five large segments,

alternating with five others of a much smaller size. The root is very astringent in its nature, and of sufficient value to be included in the Materia Medica. The avens may be generally found growing in hedges and woods, flowering during June and July, and attaining to a height of from one to two feet. The leaves are very ornamental in character, and will, equally with the flowers, prove of valuable service to the designer. For illustrations of the growth of the plant refer to F. L. vol. ii. 36, and P. F. 81.


Avens.

BEDSTRAW (*Galium verum*). This is also known as cheese rennet, gallion, and maid-hair. The word bedstraw is in allusion to the former use of the dried plant as a cheap material in forming beds. The name cheese-rennet is derived from a bygone employment of the plant for curdling milk: we see this same use of the plant referred to in the generic term *Galium*, that name being derived from the Greek word for milk. Gallion is evidently a herbalist's corruption of *Galium*, while the fourth name, maid-hair, has obvious reference to the lightness and delicacy of the plant. The minute yellow flowers grow in dense heads of blossom, while the leaves are in whorls, that is to say, several starting from the same level, and thus growing in a succession of rings round the stems. The number of the leaves in a ring is very variable; from eight to twelve is, however, the usual number. Dry banks are the ordinary habitat of the plant. It will be found in flower through-

out June, July, and August. Its lightness and graceful mode of growth admirably fit it for the purposes of the designer. For illustrations of the bedstraw refer to E. B. 648, or F. L. vol. vi. 13. The old herb-doctors, ever ready to find or make a medicinal use, speak in high commendation of the present plant for its reputed efficacy in relieving pains from burns, inward wounds, &c., while "a decoction



Bindweed.

of the herb is good to bathe the feet of travellers and lacquies, whose long running causeth weariness and stiffness in their sinews."

The BINDWEED, botanically known as the *Calystegia sepium*, is one of our most familiar plants; large surfaces of our hedgerows (Lat. *sepe*, a hedge) being covered by its graceful leaves and tubular flowers. It is a curious fact that, though abundant throughout England and Ireland, it is very local in Scotland.

The so-called convolvulus major of the garden is the *Ipomœa purpurea*, a species very widely spread over the tropical and temperate regions of the earth. Many of the family possess active medicinal qualities, and preparations from them are found in the Pharmacopœia. The English species also were at one time thus employed; but Gerarde, the great medical botanist of Queen Elizabeth's reign, will not admit that they possess any virtue at all, but rather the contrary. "They are not fit for medicine, and unprofitable weeds, and hurtful to each thing that groweth next them, and were only administered by runnegate physick-mongers, quacksalvers, old women leeches, abusers of physick, and deceivers of people." For study of the natural appearance of the flower we would refer you, if you are unable to meet with the plant itself, to E. B. 924; S. C. 2; T. N. O. 97; G. O. 99; and P. F. 76.

BITTER-SWEET. The Bitter-sweet (*Solanum Dulcamara*) is so called from the bitter flavour of the stems when first tasted, a flavour which is speedily followed by a peculiar sweetness somewhat resembling liquorice root. In not only the familiar English name, but the specific botanical appellation as well, we see this peculiarity of the plant referred to, *Dulcamara* having the same meaning as bitter-sweet. The continental names have also this curious reference in them, the plant in France being called Douce-amère; in Italy, Dulcamara; in Spain, Amaradulcis; and in Germany, Bittersusstangel. The plant is frequently called woody nightshade, while the old herbalists, in addition to the names already given, call it felonwort. *Solanum* is derived from

solamen, in reference to the soothing effect of some species of the Solanaceæ. The bitter-sweet has small flowers of a deep purple colour, the petals being very much reflexed. The berries are of a deep red when ripe, but change considerably in their colour before reaching maturity; thus on the same bunch we may frequently see green, yellow, orange, and crimson fruit. Thirty of these berries administered to a large dog killed it in less than three hours. Refer to E. B. 930; F. L. vol. i. 14; M. B. 33; S. C. 17; T. N. O. 100; and P. F. 19, for illustrations of the natural growth of the plant. This shrub is frequently confounded with the deadly nightshade, from the slight similarity of name; but there is no other point of resemblance. The two plants are totally distinct. The woody nightshade, though common in most parts of England, is comparatively scarce in Scotland and Ireland. It is a hedgerow plant, flowering during June, July, and August. A variety with white flowers is sometimes met with.

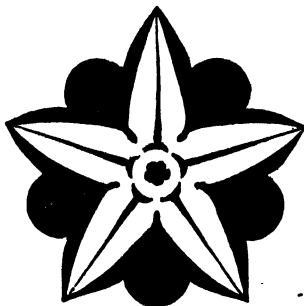
The BLACK-THORN or SLOE (*Prunus spinosa*) is curious and suggestive from an ornamentist's point of view, from the flowers, unlike most other plants, appearing in profusion before the leaves are developed. We see a plant strongly resembling the black-thorn very largely used in their ornament by the Japanese, a plant with numerous spreading branches, leafless, but thickly clustered with flowers. The black-thorn may commonly be met with in coppices and hedgerows, the blossoms appearing in March or April, and the rich purple fruit in August. The name sloe is derived from the Anglo-Saxon *sla*, and refers to the extreme acidity of the tempting-looking fruit. The natural growth may

be seen on reference to E. B. 408, or M. B. 84. The black-thorn possesses a certain value ornamentally, as being, like the primrose and snowdrop, a characteristic flower of the spring.

"Flowers, as the changing seasons roll along,
Still wait on earth, and added beauties lend;
Around the smiling Spring a lovely throng
With eager rivalry her steps attend;
Others with Summer's brighter glories blend;
Some grace mild Autumn's more majestic mien;
While some few lingering blooms the brow befriend
Of hoary Winter, and with grace serene
Enwreath the king of storms with mercy's tender sheen."

BARTON.

The BORAGE (*Borago officinalis*), though widely distributed, is by no means a common plant; and though mentioned by several old writers, must be considered as but a doubtful native. The generic name has been corrupted from two Latin words, *cor*, the heart, and *ago*, I act, from a belief, as old as the time of Pliny, in its exhilarating effects; hence the old saying, *Ego borago gaudia semper ago*, "I borage give always courage." The borage, like the comfrey and forget-me-not, belongs to the order *Boraginaceæ*, and, in common with most of the species of that order, is marked by the gyrate or scorpoid arrangement of its flowers, the stem being coiled round like the mainspring of a watch. It may be met with occasionally in the ornament of the past—its large and striking-looking stellate



Borage.

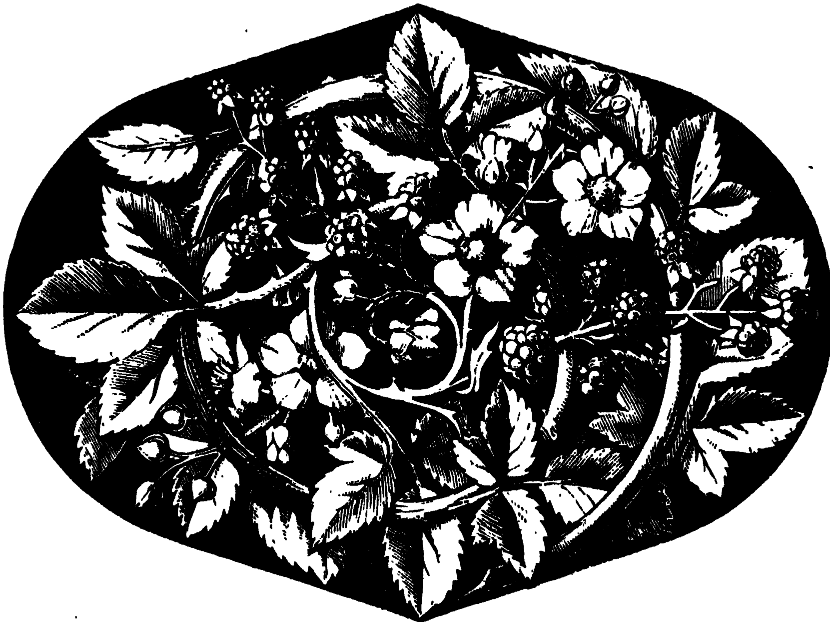
(Latin, *stella*, a star) flowers, and the general growth of the plant, being admirably adapted to the purposes of design. As an example we may instance the MS. Hours of Henry VII. in the British Museum, where the borage is introduced upon a golden ground on one of the pages. Drawings of this plant will be found in E. B. 1114; M. B. 217; T. N. O. 98; and P. F. 36.

In studying the application of natural vegetable forms to the various requirements of ornamental art—such, for instance, as the employment of bold, vigorous plants to stone or wood carving, and the more graceful and delicate growths to such fabrics as muslin and lace—we speedily find that in some cases we are unable to treat the whole of the plant we have selected for our purpose, owing to the limitations placed upon us by the requirements of the work, the exigencies of manufacture, or the nature of the materials in which our design is to be embodied. In some cases the flowers are too small in detail, or in the general mass, to accord well from the ornamentist's point of view with the foliage of the plant; the white bryony (*Bryonia dioica*), for instance, though excellently adapted for muslins, could not in its flowering stage be satisfactorily treated for stonework on this account, though the foliage by itself is admirably suited for such purpose. In other instances we find the case reversed, the flower being large and beautiful in form, and the leaves unsuited, either from their insignificant size or want of beauty, to the purpose of the ornamentist; thus, while the leaves of the stonecrop (*Sedum acre*) are, from their minuteness, scarcely available for the purposes of design, the stellate flower is exceedingly beautiful in form, and

admirably adapted for diapering and many other uses, when isolated from the rest of the plant. Where both leaf and flower are from their beauty and relative scale equally adapted for art-treatment, we are still, when circumstances require it, quite justified in employing either the one or the other by itself: where a monochrome arrangement is necessary, the leaves alone may, for example, be used; where a central radiate form, the flower may be introduced. The rosette or patera, so freely introduced both in ancient and mediæval art, is an example of this use of isolated floral forms.

The BRAMBLE or BLACKBERRY (*Rubus fruticosus*), a more familiar plant than the last, has, so far as we are aware, been but little used in ornamental art, though the *Rubus idæus*, or wild raspberry, may occasionally be seen in MSS. of the sixteenth century. The generic name is highly expressive of the prickly nature of the plant, being derived from an old Celtic verb, *reub*, to lacerate or tear away; while its English name, bramble, attests its indigenous nature, descending as it does from the Anglo-Saxon name for it, *bremel*. The stems, ordinarily of a pale purple colour and with a grey bloom upon them, are pentangular in section, the numerous prickles almost entirely confined to the ridges formed by the angles, and not occurring in the intermediate furrows; the leaves generally with five deeply serrated leaflets, a rich green on the upper surface, and covered with close white down on the lower; the petals of the blossom varying from pure white or delicate pink to a deep red; and the fruit of a rich crimson, so intense in colour as to appear almost black. The mode of growth

admirably fits it for the service of the designer, the leaves being very ornamental in form, and the long trailing stems admitting of great freedom of curve, while for its use in decorative art a further great recommendation exists in the power of representing the plant under several phases of growth without violating natural



Blackberry.

truth, as at one and the same time we find the opening bud, the fully-expanded flower, and the fruit of all sizes and stages of development, varying in colour from green, light red, and crimson, to deep purplish black in its progress to maturity. We thus gain great variety of form, and also, when admissible, of colour. The bramble appears to be of especial value in ornament

where large surfaces require to be covered by forms at once suitable in scale, interesting in their details, and varied in their character; hence it would seem admirably adapted to muslins and lace, though, so far as we have had opportunity of observation, it has not been thus employed. Reliable drawings of the blackberry will be found in W. H. H., Plate E, Fig. 1.; in T. N. O. 51; G. O. 96; and P. F. 57.

Some plants, beautiful in themselves, possess an increased importance in the eyes of the followers of ornamental art, from their being used heraldically; such, for example, are the rose, the shamrock, the broom, and the thistle. BROOM (*Sarothamnus scoparius*) is thus used as the badge of the Scottish clan Forbes, and, as all readers of history will remember, was also chosen as the device of the Plantagenets. A very good example of its use in past art—though scarcely, from its being found in a Tudor monument, having any heraldic meaning—will be seen in a glass quarry in Henry VII.'s Chapel. *Sarothamnus* is derived from two Greek verbs, signifying a shrub, and to sweep. The English name has the same force of meaning. In an old work we have consulted, the author deems it useless to go into a long account of the plant, so well known was it in his time from this domestic use:—"To spend time in writing a description hereof is altogether needless, it being so generally used by all the good housewives almost throughout this land to sweep their houses with, and, therefore, very well known to all sorts of people." The broom may ordinarily be found on sandy commons, railway banks, and dry hillsides. The large yellow pea-shaped flowers appear in

great profusion throughout May and June, and are succeeded in due course by the black seed-pods. The plant grows from three to six feet high, and when covered with its brilliant blossoms is a very striking object. Leaves very inconspicuous. Drawings of this very beautiful plant may be seen on referring to S. B. 121; E. B. 329; M. B. 89; F. L. vol. v. 314 S. C. 67; T. N. O. 49.

BULBOUS CROWFOOT. We have selected the present plant (*Ranunculus bulbosus*) as a good representative of the numerous species of plants familiarly termed buttercups, partly because it is the most striking in effect, partly because it is the one that will most readily be met with under ordinary circumstances; for while its fine flowers and beautifully-cut leaves render it singularly well suited to the purposes of ornament, the abundance of it in every meadow throughout the country places it within the reach of all who would desire to adapt it to any artistic purpose. From the commonness of the plant, and its general distribution throughout England, it has received many other names: goldknob, goldcup, baffiner, troil-flower, polt, kingcup, buttercup, butter-flower, cuckoo-bud, are all synonyms. The term *Ranunculus* is derived from *rana*, a frog, many of the species being found in wet, swampy places; while the specific name, *bulbosus*, alludes to the bulb-like swelling of the lower part of the stem in this particular species. The name crowfoot has been given to the plant from the radiating character of the segments of the leaf, spreading as they do like the divisions of a bird's foot; while the use of the word buttercup points to the old belief that the rich

yellowness of spring butter is owing to the eating of this plant by the cows; the effect must rather, however, be ascribed to the tender grass, as any one who will take the trouble to notice the fact will find that cows in a meadow will, as far as possible, avoid the buttercups. The leaves of the bulbous crowfoot, like, with one exception, those of the rest of the family, are very acrid, and will, if applied to the skin, speedily blister it. The plant will be found in flower throughout the spring and summer: a variety is sometimes met with having cream-coloured flowers. The crowfoot is one of the favourite plants in the ornament of the Decorated period of Gothic. Representations of the natural plant may be seen on consulting E. B. 35, or F. L. vol. i. 38; refer also to "Water Crowfoot" in the present work, page 84.

CELANDINE (*Chelidonium majus*). The Celandine, though, so far as we are aware, not to be met with in ornamental art, is a plant in every way fitted for the purposes of the designer, whether we consider the form of the flower, of the pods which succeed the blossoms, or the rich outline of the leaf. The inflorescence is umbellate (Lat. *umbella*, an umbrella), that is to say, all the flower-stalks start from the same point in the stem, as in the case of the hemlock, the cowslip, flowering rush, and many other plants. *Chelidonium* is derived from the Greek word *chelidon*, a swallow, from an old belief that the plant came into flower on the arrival of those birds, and withered when they took their departure; hence in old writings we frequently find the Celandine termed swallow-wort. The plant will commonly be found in waste places, and more especially near human habitations. It

attains to a height of about two feet, and flowers throughout May, June, July, and August. Consult S. B. 95; E. B. 67; M. B. 263; S. C. 86, for drawings of the natural growth of the celandine.

The CINQUEFOIL (*Potentilla reptans*). This graceful little plant may generally be met with in abundance, a very favourite habitat being in the low grass and coarse herbage we so frequently find skirting the pathways in country districts. When it has once taken root upon any favourable spot, it speedily throws out long running stems, which, in turn, develop roots from the points whence the leaves spring; in a very short space of time a large extent of ground is covered with a dense mass of the plant, and, from its habit of rooting at each joint, it is with great difficulty eradicated, since if one root alone be overlooked, the labour spent will speedily prove to have been but of little more than temporary use. Regarding the cinquefoil, however, rather from the standpoint of the ornamentist than of the agriculturist, we are struck by the beauty of its growth, the forms of the individual parts, and the general fitness of the plant for employment in Decorative art. The familiar name cinquefoil clearly alludes to the division of the leaves into five conspicuous leaflets, though when the plant is growing under exceptionably favourable circumstances these are very frequently seven in number. The generic name is derived from the Latin *potens*, powerful, and refers to the strong medicinal qualities possessed by some of the species of *Potentilla*. The root of the tormentil (*P. tormentilla*), an allied species, is very powerfully astringent; it has occasionally been substituted for oak-bark in tanning, and with equal success, the leather being found to be in

no way inferior in quality. The properties possessed by the roots of the cinquefoil are very similar, but, from being less powerful in their operation, are now rarely used, their value being naturally



Cinquefoil.

greater at a time when stronger foreign astringents were not so readily procurable. Tormentil root is still, however, retained in the Pharmacopœia. The distinctive specific name of the present

plant, *reptans*, has evident allusion to the marked feature in its growth already referred to, being derived from the Latin *reptare*, to creep. We are not aware of any examples of the use of the cinquefoil in the art of any past period, though from the size and beauty of form of the leaves and blossoms, and from the grace and freedom of the curves of which the main stem is capable, it appears to be well adapted to ornamental art. Refer to E. B. 432; F. L. vol. i. 37; M. B. 59; and P. F. 46, for the natural growth.

COCKLE. This, though now so frequently met with in the midst of the corn, being in fact so common as to be classed amongst the farmer's pests, is not an indigenous plant; it has, however, been established so long that it may very fairly be comprehended in our list. The botanical name of the plant is *Lychnis githago*. The whole plant is closely covered with soft hairs, giving it a woolly appearance. The large purple flowers are very conspicuous, and have a curious effect, from the segments of the calyx being so much longer than the petals of the corolla. (*Calyx*, Gr., a cup, the outer and generally green portions of a flower, the protecting member for the delicate organs within the flower. When the calyx is cut up into several divisions each segment is termed a *sepal*. *Corolla*, the floral ring next within the calyx, ordinarily of a brilliant colour, the part which, for instance, in a rose is pink: this, though sometimes in one piece, as in a blue-bell, is ordinarily, as in the buttercup, composed of several similar members; these are called *petals*.) The cockle will be found in flower during the months of June, July, and August. Though admirably adapted for service in ornamental art, the only

example we can quote occurs in a sixteenth-century MS., a missal, in the British Museum: the treatment is very naturalistic. Drawings of the plant will be found in F. L. vol. iii. 27; E. B. 215.

COLUMBINE (*Aquilegia vulgaris*), one of our most beautiful wild flowers, derives, like the broom, an additional importance to the ornamentist from its heraldic associations, the columbine being adopted as a badge by the House of Lancaster, and also by the Derby family at a time when every important house adopted some such symbol. The petals bear a strong resemblance to birds; hence *Aquilegia* is derived from the Latin *aquila*, an eagle, while the English name is derived from Lat. *columba*, a dove. An old English name for the plant is culverwort, *culfre* being the Anglo-Saxon word for pigeon. It will be found in hedges and thickets, thriving more especially where the soil is calcareous. Both the flower and leaf are very rich in character, and well suited for the requirements of ornamental art. Examples may be seen in the church of Shearbourne, Dorset, and in the spandrels of the canopy of a brass in Exeter Cathedral, in memory of Sir Peter Courteney, one of the adherents of the Lancastrian king, Henry IV. The columbine is a favourite flower in cottage-gardens, and may be much more generally thus met with than as a wild plant. It is in flower from May to July. A very beautiful gradation of form is seen in the leaves, the lower ones being of a very complex form, while the upper ones are very simple in outline. Refer to E. B. 46, V. W. 367, for drawings.

The COMFREY (*Symphytum officinale*). This plant may be very commonly found by the sides of streams, ditches, and other moist

situations. The corolla of the flower is generally of a yellowish white, but a variety having purple flowers is not uncommon in many localities; we have seen it, for instance, growing in profusion on



Comfrey.

the banks of the East Yar, between Brading and Sandown, in the Isle of Wight. The generic name, *Symphytum*, is derived from a Greek verb signifying to unite, from an old belief in the efficacy

of the Comfrey in the healing of wounds. A very marked peculiarity in the growth of the plant is the circinate, or, as it is frequently termed, scorpoid arrangement of the flowers, from a supposed resemblance between the spiral form of the inflorescence and the tail of the scorpion; hence, in the same way, scorpion-grass is one of the old English names of the familiar forget-me-not, a plant belonging to the same natural order, the *Boraginaceæ*, and having the same peculiarity of growth. We need scarcely say that in the Middle Ages the favourite dogma that each plant had its undoubted value as a remedial agent, and generally by its form or colour indicated its medicinal use, was firmly held; thus the colour and shape of the flower of the foxglove, formerly called the throat-wort, were considered as indications of its service in complaints affecting the throat, as its older name implies; and the deep red colour often assumed, as the summer advances, by the leaves of the herb-robert and others of the cranesbill family, was deemed conclusive proof of the value of the plants in stanching the flow of blood from a wound; hence, in the case of the forget-me-not, we find an old writer on medicine referring to the healing virtues of the plant as shown by its mode of growth: "The whole branche of floures do turne themselves round like the taile of the scorpion. The leaves of scorpion-grass applied to the place are a present remedy against the stinging of scorpions, and likewise boyled in wine and drunke, prevaile against the said bitings, as also of adders, snakes, and such venomous beasts." Drawings of the comfrey may be seen on referring to F. L. vol. iv. 18; V. W. 432.

The FIELD CONVOLVULUS (*Convolvulus arvensis*). This pretty little plant is very commonly found on grassy banks, open downs, or in our corn-fields, running up the stems of the standing corn, and flowering during June, July, and August. It is one of the enemies of the farmer, from its spreading, to the detriment of the crops, over so large an area of ground; and owing to the great depth to which the roots descend, it is exceedingly difficult to get rid of it when it has once taken possession. Its generic name, derived from the Latin *convolvo*, I entwine, is very descriptive of the nature of the plant, and its English name, bindweed, evidently embodies the same idea. Another of its old English names, the withwinde, very beautifully expresses its lightness and delicacy, unable to resist the force of the wind, but conquering by yielding to its power. Where the plant occurs, it will generally be very common, many square feet of ground being often covered by its long trailing stems. When any suitable object, such as a grass stem, is met with, the convolvulus, too weak to rise by itself, ceases to trail along the ground, and twines round the support thus afforded, always ascending in a spiral direction to the left, as do also the *C. major* of the flower-garden, the scarlet-runner bean, and many others; while others, as the hop, invariably ascend in a spiral direction from left to right. It may at first sight seem difficult to establish this, but if the reader will imagine the plant in question turning round his own body, he will at once be able to determine whether the plant in ascending would cross in front of him from right to left, or from left to right. In introducing this plant in ornament, it will be

necessary to remember, that though frequently represented as possessing tendrils, it does not in nature acquire the needed support by such means, the stalk itself being the part of the



Convolvulus.

plant that entwines round other plants. The means thus employed by climbing plants are very varied; the ivy, for instance, throwing out root-like forms from the stems, which, by



Convolvulus.

their grasp and penetration into the hollows of brickwork or the bark of other trees, amply suffice to support the plant; the bryony, passion-flower, and many other plants throw out true tendrils

from the stem; the goose-grass clings by means of the small hook-like appendages with which the stems and under sides of the leaves are furnished; while in the pea the tendrils spring from the end of the leaf-petiole. The *C. arvensis*, like the silverweed, the pimpernel, and many other equally familiar plants, seem to be cosmopolitan. De Candolle, in his "Géographie Botanique," records its occurrence in a truly indigenous state in localities so widely differing in temperature, soil, &c., as Sweden, Siberia, China, India, Persia, Arabia, Egypt, Abyssinia, New Holland, Mauritius, the Azores, Canada, Mexico, and Chili. The only instances of the use of the plant in mediæval ornament with which we are acquainted are in wood-carving on the ends of the stalls in Wells Cathedral, and in a similar position in the Church of St. Gereon, Cologne; in each case the leaves only are represented. Illustrations of the natural growth will be seen in S. B. 166; E. B. 923; T. N. O. 97; and P. F. 93.

The CORN BLUE-BOTTLE (*Centaurea Cyanus*), from its delicacy of growth, and the beauty of the flower-heads, would be a valuable plant for the decoration of surfaces requiring a delicate treatment, such as muslins and lace. It is one of the characteristic flowers of the corn-field, and, in conjunction with the poppy, would be valuable in any floral grouping symbolic of autumn. The plant was at one time held to possess great remedial virtue, though its use is now abandoned. The generic name, *Centaurea*, refers to an old legend that the Centaur Chiron, when wounded by Hercules, recovered his strength by the use of this herb. A very characteristic name in some parts of the

country is hurt-sickle, in allusion to its hard and wiry stems. An example of its use in ornamental art will be found in a sixteenth-century MS. in the Library of the British Museum. The treatment, as is usual at that period of the illuminator's art, is very naturalistic. Drawings of the natural plant may be seen in S. B. 159; E. B. 709; F. L. vol. vi. 62; and P. F. 8.

The CORN MARIGOLD (*Chrysanthemum segetum*) is, like the last, one of the characteristic and striking plants of the harvest-field, the intense scarlet of the poppy, the rich blue of the blue-bottle, and the brilliant yellow of the present flower, forming a very beautiful trio. The generic name, *Chrysanthemum*, alludes to this brilliancy of colour seen in several of the species, being derived from two Greek words signifying golden flower. There is considerable quaintness in the forms of the leaves, and the general growth of the plant renders it well adapted for art-treatment. We are unable to refer you to any examples of its introduction in the ornament of the past, but any of our readers desiring to remedy a neglect so unjustifiable will find reliable drawings of it in E. B. 713; F. L. vol. vi. 60; P. F. 28.

The DAFFODIL (*Narcissus pseudo-narcissus*). This beautiful flower will be found of value to the designer, both from its own inherent beauty, and also more especially in combination with the primrose, wild hyacinth, or cowslip, in any design where it is desirable to embody the idea of spring, since it is one of the most striking plants of that season of the year. The daffodil may be found in meadows and copses, and is generally abundant throughout England, though in many cases probably as an escape from the

cottage-garden. In Ireland and Scotland it is never met with except under such circumstances. Where the daffodil has once established itself it grows with great freedom, and will generally be met with in profusion, though it is so local in its growth, that even if abundant in any one spot, it may frequently be sought for in vain throughout the rest of a district. The flowers, of a pure and brilliant yellow, grow singly upon the stalks, each rising directly from the root. The daffodil has a very wide area of distribution, being met with throughout the greater part of Europe, and more especially in the south-west; it is, for instance, one of the characteristic plants of the meadows and hillside pastures of Spain, together with the two-flowered narcissus (*N. biflorus*), a plant which, though abundant in Southern Europe, has never been naturalised in England. It may be frequently met with in cultivation, and will easily be distinguished from the daffodil from the flowers being generally in pairs upon the stem, and from their creamy white or straw colour. The generic name, *Narcissus*, is derived from a Greek word signifying stupor, in allusion to the heavy and powerful odour of another species, the *N. poeticus*.

Drawings of the daffodil will be met with in E. B. 1501, and P. F. 89. The daffodil being like the daisy and eglantine, what we may perhaps be allowed to term a poet's flower, a further reason for intimacy with it is furnished to the designer, as he may possibly be required to make a design for a page border to some *édition de luxe* of Wordsworth or Herrick.

The DAISY (*Bellis perennis*). So many rural and poetic

associations cluster around this "wee, modest, crimson-tipped flower," that our list would be sadly incomplete did it not find a place in it. Leaving the consideration of these associations, however, we would desire to point out that on its own inherent merits it is a plant admirably adapted for art-work, the forms of the leaves, buds, and flowers being all very ornamental in character, and well suited to the decoration of any light fabric. The generic name, *Bellis*, testifies to the general appreciation, being derived from the Lat. *bellus*, pretty. Daisy is a corruption of its old English name, day's eye.

> "As soon as ever the sunne ginneth west
> To sene this flower, how it will go to rest,
> For fear of night, so hateth she darkness.
> Well by reason men it call maie
> The Daisie, or else the Eye of the Daie."

In France it is called *Marguerite*, from Lat. *margarita*, a pearl, —hence ladies of gentle birth, of that name, frequently chose it in the days of chivalry as their device. It may be seen carved in stone on the gateway of St. John's College, Cambridge, founded by Margaret, Countess of Richmond. It also occurs in carvings at Cubberley, Gloucestershire; Coton, in Cambridgeshire; and Culham, in Oxfordshire.

> "The daisie, or flower white and rede,
> And in French called la belle Marguerite,
> To herne I have so great affectioun
> As I sayd erst, when commeth is the Maie,
> That in my bedde there daweneth me no daie
> That I n'am up and walking in the mede
> To see this floure ayenst the sunne sprede,

So glad am I, that when I have presence
Of it to doue it all reverence,
As she that is of all floures the floure,
Fulfilled of all vertue and honoure;
And ever ylike faire and fresh of hewe;
And ever I love it, and ever ylike newe."

CHAUCER.

The family of Parr bore as one of their devices a tuft of daisies. The daisy may be met with abundantly in pasture land and the grassy borders of country roads, blooming freely from April to October. Illustrations may be seen in E. B. 772; F. L. vol. i. 62; T. N. O. 76; P. F. 63.

The DOG-ROSE (*Rosa canina*). This is one of the commonest of our numerous species of English wild rose—a family which, like the brambles, willows, and others, has by some botanists been cut up into several species from more or less obvious botanical marks, frequently of a nature, however, which subjects them to be by other observers considered as mere variations depending upon chance external influences; thus, while one writer reduces the various rose forms to five specific types, another, of equally high standing, mentions nineteen species as occurring in Britain. This refinement of scientific observation will, however, be of no real service to the designer: for his purpose the dog-rose, the most familiar of our English species, may be accepted as a fairly typical flower. The garden varieties of roses are derived from the *Rosa sempervirens* of Southern Europe, the *R. Indica*, an Asiatic species, and many others. The sweet-briar, *R. rubiginosa*, one of our wild English species, is also a favourite in many gardens from the fragrance of its leaves when pressed in the hand. The

word rose is derived, according to some authors, from the Celtic *rhos*, which is in turn derived from the adjective *rhodd*, red; while others affirm that it descends to us from the Latin *rosa*, itself deduced from the Greek *rodon*, derived from *erythros*, red; but we are unable to give any satisfactory clue to the meaning of the prefix "dog" in the familiar English name, the same idea being



Dog-Rose.

also evidently expressed in the specific word *canina*, in the French *rose de chien*, and the German *Hundrose*. Some writers, however, imagine it to refer to the uselessness of the plant, and quote the scentless or dog-violet as another illustration in support of their theory. Even on the lowest utilitarian ground this theory is scarcely tenable, since the plant is largely used by gardeners as a

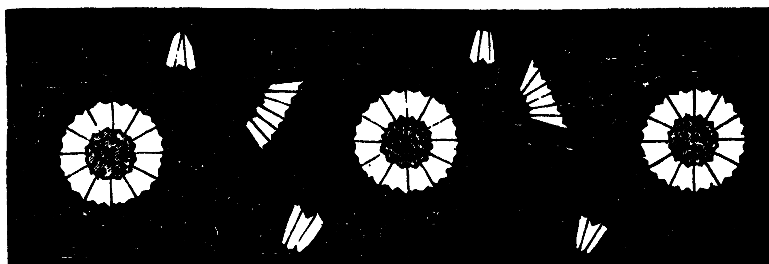
stock for grafting, while the fruit is also considerably employed in medicine. The rose, though commonly met with in ornament throughout the whole of the Decorated and Perpendicular periods of Gothic, is more especially found in the latter, since it was then employed not merely on its own merits, but also as the badge of the Tudors; hence, as an heraldic form, we frequently meet with it in secular no less than in ecclesiastical work. It is also, we need scarcely say, the badge of England, as the shamrock and thistle are of Ireland and Scotland respectively. It was also the personal badge of Edward I., and the family device of the De la Warres. Examples of the heraldic use of the rose are very numerous; it may merely suffice to mention Hampton Court and Henry VII.'s Chapel at Westminster as abounding in illustrations. In the church at Hawton, Nottinghamshire, in a sculptured representation of the Resurrection, there is as a background a very elaborate and beautiful diaper of the rose—its leaves, flowers, and buds being all employed; this, as the Rose of Sharon, may be considered as introduced in a symbolic sense, though we must here mention that the plant ordinarily known as the Rose of Sharon is not a true rose at all botanically. It is one of the Hypericums. A golden rose has from time to time been given by the popes to those whom they more especially desired to reward for services rendered to the Church: Henry VIII. of England received, together with his title "Defender of the Faith," this mark of honour from Pope Alexander VI. The dog-rose will be found in flower in early summer, the colour of the blossoms varying on different shrubs from pure white to a deep

pink; the brilliant scarlet fruit, an equally ornamental feature, being met with as the season advances. Illustrations of the natural growth of the plant will be seen in M. B. 139, S. C. 100, P. F. 7, 90, 96; and T. N. O. 51.

Examples of its use in decorative art occur at Winchester, where a hollow moulding is filled with a waved line of rose leaves and flowers; in a boss in Beverley Minster; in a glass quarry at Yaxley, Suffolk; in a more conventionalised treatment in a panel of Perpendicular period, East Harling Church, Norfolk; a very good example as a glass quarry, Milton Church, Cambridge; in a piece of oak-carving in the stalls at Wells; in the carving of a tomb in Bourges Cathedral; a capital at Miraflores; a hollow moulding wreathed with alternate flowers and leaves in one of the doorways of Notre Dame, Paris. Many other instances might be given, but these will suffice to show how favourite a plant the rose has been in past ornament. The following extract from the old herbalist Gerarde, though the adulation is, from its implied reference to Elizabeth, somewhat fulsome, is a further illustration of its association heraldically with the Tudors: "The plant of roses, though it be a shrub full of prickles, yet it had bin more fit and convenient to have placed it with the most glorious flowers of the world, than to insert the same here among base and thorny shrubs" (this allusion refers to Gerarde's system of classification), "for the rose doth deserve the chief and prime place among all flowers whatsoever, being not only esteemed for his beauty, vertues, and his fragrant and odoriferous smell, but also because it is the honour and ornament

of our English Scepter, in the uniting of those two most Royall Houses of Lancaster and Yorke."

The subject of our next illustration is derived from the FEVERFEW (*Chrysanthemum parthenium*), a plant widely distributed over Britain, but at the same time with doubtful claims to be considered a true native; it is, however, thoroughly at home in those places in which it is to be met with, and from the clear white daisy-like flowers and the delicate green of its handsome foliage it merits the attention of designers of ornamental art.



Feverfew.

From its lightness and the deep cutting of the leaves, the feverfew would be found of more service in painted or engraved ornament than in any kind of relief work. The feverfew has a reputation among herbalists as a bitter and tonic; and no doubt, before the introduction of quinine and such-like more powerful remedies, would possess a valued and considerable remedial virtue. The familiar English name implies this, and is one of the numerous class of names, as eyebright, goutweed, lungroot, livelong, wormwood, &c., given to plants in recognition

of their real or fancied medicinal use. Drawings of the natural growth of the feverfew may be seen in E. B. 715; M. B. 249; P. F. 39.

FOOL'S PARSLEY. We have selected this plant, the *Æthusa cynapium*, as a good representative of the very large order of plants known botanically as the *Umbelliferæ*. The whole of the plants of this order, as the namc implies, have their flowers growing in umbels, that is to say, all the flower-stalks start from one point on the stem, and radiate from the common centre. Many of the *Umbelliferæ*, as the parsley, carrot, fennel, and celery, must be familiar to our readers, though they may not have noticed particularly this umbellate mode of flowering. Several of the species are exceedingly poisonous: of these we may instance the hemlock, the water-dropwort, and the present plant. With very few exceptions, the flowers of the whole of the plants of this order are either white or yellow. The fool's parsley is so called from a slight resemblance which the plant bears to the common parsley of the kitchen-garden. Though the differences are not difficult to detect—the flowers, for instance, of the fool's parsley being white, and those of garden-parsley yellow; the leaves of the first giving a disagreeable odour when bruised, and those of the second a rich aromatic scent—the want of a little circumspection has frequently led to serious and even fatal results. The plant is the more dangerous from its being rarely met with except on cultivated ground. The generic name, *Æthusa*, is given to it in allusion to its acrid nature, being derived from a Greek word signifying to burn, while *cynapium* means dog's parsley. Though as yet we have

said nothing but evil of it, it is but just to add in its favour that, ornamentally, it is a very desirable plant for insertion in our list, the leaves, flower-buds, and general growth being very graceful, and well suited for the decoration of any delicate fabric. For illustrations of the plant we would refer you to F. L. vol. i. 18; S. C. 8; S. B. 139. It will be found in flower during July and August.

The GROUND-IVY (*Nepeta glechoma*), the subject of our next two illustrations, is so commonly distributed throughout Britain, that there can be but little need of our dwelling at any great length upon a description of it, though, from its habit of trailing on the ground and among the roots of larger plants, it is not so conspicuous to the eye as many others. Its English name, ground-ivy, refers to its slight resemblance in mode of growth to the common ivy, though in every other respect they are very dissimilar, the ground-ivy having rounded or reniform leaves growing in pairs up the stem, the flowers large and of a brilliant colour, tubular and bisymmetrical, while in the ivy the leaves terminate in an acute point, and spring singly from the stem, the flowers small, pale green, multisymmetrical in form, and composed of five distinct petals. The generic name, *Nepeta*, is derived from *nepa*, a scorpion, from an old belief that the bite of the scorpion was rendered harmless if treated by means of a recipe of which a preparation of our present plant was the leading ingredient. The flower of the ground-ivy, though generally of a deep purplish blue, may sometimes be met with of a pure white. This variation from a given colour to white is comparatively not uncommon in many of our wild plants, though more especially noticeable in

plants of normally blue or purple flowers: thus the purple foxglove, blue Jacob's ladder, pink herb-robert, purple snapdragon, blue harebell, and many others, are occasionally to be found with white blossoms. The ground-ivy, from its abundance, and also from its past and present medicinal use, may be met with in the works of various authors under a great choice of synonyms: of these alehoof is the most common; others, almost equally familiar, being creep-by-ground and cat's-foot. When not in flower the general appearance of the marsh pennywort (*Hydrocotyle vulgaris*)



Ground-Ivy.

is, to a casual observer, not altogether unlike that of the ground-ivy; but the pennywort is only met with on swampy ground, the leaves are peltate or shield-like, the stalk rising from the centre of the under side of the leaf, as we see it in the more familiar garden nasturtium (*Tropæolum majus*), differing in these respects from the ground-ivy. When in blossom, the contrast between the greenish-yellow flower of the pennywort and the deep purple of the flowers of the ground-ivy is too marked to permit of any chance of error. The only examples of the use of the ground-ivy

with which we are acquainted in the ornament of the past are in a small spandrel in one of the doorways at Rheims Cathedral, and on some of the flooring tiles from the ruins of the Abbey of Chertsey, Surrey. In the latter case the leaves are four in number, in a cruciform arrangement within a quatrefoil—a very simple yet true and effective treatment of the plant; for as the leaves grow, as we have already mentioned, in pairs, and as each pair of leaves is placed upon the stem at right angles to the pairs immediately above and beneath it, the effect produced



Ground-Ivy.

in looking down upon the plant is necessarily cruciform in character. A great variety of these Chertsey tiles may be seen in the South Kensington Museum: though very simple in design, they afford excellent examples of the true application of the principles which should govern the introduction of natural forms, and are well worthy of the attention of the student of decorative art. In both these cases, Rheims and Chertsey, the leaves alone are employed, as the flowers, from their intricacy of detail and position upon the plant, would require the aid of colour to bring

them out with due effect; hence, while the ground-ivy, during its period of flowering, is admirably adapted for surface decoration, muslins, wall-papers, and many other such-like purposes, it is but ill suited to relief-work in stone or wood. Refer to S. B. 172; E. B. 1055; F. L. vol. ii. 44; M. B. 28, for illustrations of the natural growth of the ground-ivy.

GROUNDSEL, though a plant exceedingly likely to be overlooked, is on that account the more deserving of a place in our list, as it really possesses qualities which fully entitle it to the consideration of the student of ornamental art, the general growth of a good specimen being very vigorous and characteristic, and the variety of beautiful forms seen in the leaves a further recommendation. The botanical name is *Senecio vulgaris*. *Senecio* is derived from *senex*, an old man, in allusion to the grey heads of seed-down which succeed the blossoms. The groundsel may be met with abundantly almost everywhere, and may at all times of the year be found in flower. Drawings of the plant may be seen in E. B. 749; F. L. vol. i. 61; P. F. 2.

The HAREBELL (*Campanula rotundifolia*). This graceful little plant may generally be found in profusion on dry and hilly pastures and heaths, though by no means in such localities exclusively, as the roadside hedge-bank is another favourite spot. There are ten species indigenous to England, most of them of great beauty and adaptability to art-requirements: of these we may in particular mention the *C. hederacea*, the ivy-leaved campanula, a little plant by no means uncommon in moist shady pastures and swampy low-lying ground. The present species is

abundant everywhere throughout Europe and Northern Asia. The Canterbury bell (*C. medium*) is an allied and familiar garden species.

The generic name, *Campanula*, means a little bell, and from the shape of the corolla is aptly applied to these plants. *Rotundifolia*, meaning round-leaved, seems at first sight a misnomer, as the leaves most easily visible on a cursory glance at the plant are thin and strap-shaped. The lower leaves of the plant, however, are rounded in form; and, as we study the foliage, we shall see



Harebell.

a delicate ascending gradation of form, from the rounded leaves at the lower end of the stem, to the thin, almost grass-like leaves of the upper part. Drawings of the harebell will be found in T. N. O. 80; P. F. 12.

The HAZEL-NUT (*Corylus avellana*) is so familiar a shrub that any lengthened description of it must be needless, or, to quote our old writer, Gerarde: "Our hedge-nut, or hazel-nut tree, which is very well knowne, and therefore needeth not any description, whereof there are also sundry sorts, some great, some little, as also one that is in our gardens, which is very

great, bigger than any filberd, and yet a kinde of hedge-nut; this then that hath beene said shall suffice for hedge-nuts." The smaller twigs of the hazel afford an excellent charcoal for artistic purposes, and the long straight shoots, thrown up with such rapidity and vigour, are largely employed in the manu-



Nut.

facture of the crates in which earthenware is packed—a use for which their size and flexibility combined with great strength admirably fit them, as the rods, when the wood is still green, may be bent almost double before they will give way. There is a pleasing appropriateness in its English name, hazel-nut, derived

from the Anglo-Saxon *haesel*, a hat, and *hnut*, a nut or ball, which we notice and appreciate when we see the fruit in its natural state, surrounded by the foliaceous and cap-like partial envelope formed by the scales of the involucre. The generic name also, *Corylus*, refers to this peculiarity of growth, being derived from a Greek word signifying a covering for the head. The natural order to which the hazel belongs includes several trees of great value to man, either on account of their timber or their fruit—such, for example, as the beech, Spanish chestnut, and the oak; and in the olden time, when a belief in the use of the divining-rod, as an indicator of subterranean springs, was common, the mystic virtue was sought in the forked twigs of the hazel. The size of the leaves and the striking character of the fruit alike combine to render it a plant admirably fitted for the purposes of ornamental art, though the only example of its use, so far as we are aware, may be seen in a hollow moulding in the cathedral at Winchester, where, upon a continuous scroll running along the centre of the moulding, both foliage and fruit are introduced. The leaves are deeply serrated, and the nuts grow in clusters of two, three, or four, the general treatment being very naturalistic. Among the many extraordinary remedies in use by our ancestors, hazel-nuts occupied a place, being employed in complaints affecting the chest, though, even then, when scarcely any reputed remedy seems to have been thought too fanciful and absurd, some appear to have ventured to doubt the efficacy of the medicine, bringing down upon themselves the scathing rebuke of the faculty, as we find in the follow-

ing extract from an old medical work, where, after the setting forth of the benefits to be derived from the use of the hazel as a remedial agent, he goes on to say:—"And if this be true, as it is, then why should the vulgar so familiarly affirm that eating nuts causeth shortness of breath? than which nothing is falser. For how can that which strengthens the lungs cause shortness of breath? I confess the opinion is far older than I am; I know tradition was a friend to error before, but never that he was the father of slander; or are men's tongues so given to slandering one another, that they must slander nuts too to keep their tongues in use? And so thus have I made an apology for nuts, which cannot speak for themselves." For illustrations of the growth of the nut, see W. H. H., Plate B, Fig. 1; T. N. O. 127.

Our next illustration is derived from the HAWTHORN, WHITE-THORN, or MAY (*Cratægus oxycantha*), a plant familiar to every one, from its being so extensively used for hedgerows; its strength, closeness of growth, and spiny character, admirably adapting it to the purpose. The wood is very hard, and will take a high polish; the generic name, *Cratægus*, from a Greek word signifying strength, being an allusion to this characteristic of the plant. Its use as a hedgerow plant in England dates, according to Sowerby, from the time of the Romans, and of this there can be but little doubt, as its most common name—hawthorn—is, literally, the hedge-thorn, from the Saxon word *hage*. The second name—white-thorn—has been given to it in contradistinction to the black-thorn (*Prunus spinosa*), a somewhat similar, and, in a wild state, almost equally common plant; the

stems of the latter being very dark in colour, while in the hawthorn or white-thorn they are comparatively light. The third name, May, has obvious reference to the time of flowering. The leaves of the plant are exceedingly varied in form, affording a great choice for the selection of the ornamentist; some being



Hawthorn.

very simple in character, while others are deeply cut, and very rich and beautiful in outline. A permanent variety may be occasionally met with, in which the leaves, instead of being of the ordinary deep and bluish green, are in addition irregularly blotched with varying and intermingling tones of yellow. The flowers also of the hawthorn are subject to considerable variation

in colour: the typical state is a pure milky white; but owing to the nature of the soil in which the plant is found, the blossoms may occasionally be seen varying from a pale pink to almost crimson. The berries, also, though generally of a deep crimson colour, are sometimes of an intensely golden yellow. An old writer, Culpepper, in his "British Herbal," a treatise partly astrological and partly medicinal, having first stated that the plant is under the dominion of Mars, thus defines the medicinal properties of the hawthorn:—"The seeds in the berries, beaten to powder, being drank in wine, are held singular good against the dropsy. The seed, cleared from the down, bruised and boiled in wine, and drank, is good for inward tormenting pains. If cloths and sponges be wet in the distilled water, and applied to any place wherein thorns and splinters, or the like, do abide in the flesh, it will notably draw them forth. And thus you see the thorn gives a medicine for its own pricking, and so doth almost everything else."

Though to a certain extent foreign to our subject, we may perhaps be permitted to say that, to the naturalist, as well as to the botanist and the designer of ornamental art, the tree possesses considerable attractions, the berries being the favourite fruit of many of our birds, and the foliage being sometimes completely stripped by the larvæ of various butterflies and moths, such as the small Ermine, the Brimstone moth, and many others; while among the poets, Chaucer, Milton, Shakspeare, Wordsworth, Goldsmith, Bampfylde, and Tennyson, have all found in it a source of beauty and inspiration. It has also been one

of the favourite plants of the ornamentists, occurring very commonly in the works of the Middle Ages. It would be both tedious and unnecessary to give anything like an exhaustive catalogue of its use in past art: as good examples out of many, we would merely cite its occurrence in a finial in the Lady Chapel, Exeter; as a stone-diaper alternating with oak, at Lincoln; in two fine spandrels, and a beautiful capital, very full and rich in its wreathing, in the Chapter-house, Southwell. Other examples occur in the cathedrals at Ely, Wells, and Winchester. Wherever met with in ornamental art, the leaves and berries are the parts selected: to the best of our knowledge the flowers have never, in any instance, been introduced, no doubt from the fact of the minuteness and delicacy of each individual blossom, and its habit of growing in clusters, which, though extremely beautiful in nature, are, from their intricacy of detail, unsuited to the purposes of the ornamentist. Similarly, though the plant in its natural growth is often exceedingly spiny, it is, in ornamental art, represented as almost or entirely without this characteristic feature, as there would be a great practical difficulty, in any kind of relief-work at least, in the satisfactory introduction of forms so minute and fragile, yet requiring so high a relief. Drawings of hawthorn will be found in P. F. 68; T. N. O. 52.

The HERB-ROBERT (*Geranium Robertianum*) is one of the numerous family of cranesbills, so called from a supposed resemblance between the form of the fruit and the bill of that bird, a resemblance also indicated in the generic name, *Geranium*, derived

from the Greek *geranos*, a crane. The herb-robert is one of the most abundantly distributed plants of the genus, being met with throughout the whole of Britain and in many other parts of the world, growing upon all kinds of soils, and flourishing equally well upon hedge-banks, waste ground, and old walls. Owing to the foliage turning a brilliant crimson in autumn, the plant becomes very striking and conspicuous as the year advances, a peculiarity which will greatly aid its identification by those of our readers who are not acquainted with it. The flowers are of a



Herb-Robert.

delicate pink colour, though they may occasionally be met with of a pure white: this variety grows abundantly near Nutfield, in Surrey, for instance. The whole of the cranesbill family will well repay the attention and study of the ornamentist, the dove's-foot cranesbill (*G. molle*), and the blue meadow cranesbill (*G. pratense*), being especially suited to the requirements of the designer. The latter is a very striking plant, and when once seen cannot well be mistaken, each flower being almost two inches in diameter, of a deep purple blue, and veined with lines of reddish purple: the

leaves also are very deeply cut, and of a highly ornamental character. An illustration of the ornamental treatment of the herb-robert may be seen in an elaborate specimen of embroidery, last-century work, in the South Kensington Museum; while drawings of the natural plant can be referred to in T. N. O. 38; V. W. 412; F. L. vol. i. 52; P. F. 34.

HOLLY (*Ilex aquifolium*). This plant, from its association with winter, should be one of those familiar to the student of ornamental art. Drawings of it may be found in S. B. 184; W. H. H., Plate A, Fig. 4; P. F. 27; G. O. 95. The holly is indigenous to most parts of Europe. Its influence may be traced in the names of several places, as for example Holmwood, near Dorking; the holly by old writers being also termed Holm and Hulver. Though ordinarily met with as a hedgerow shrub, it will, if allowed to grow, attain to no inconsiderable height—often thirty to forty feet; while a particularly fine specimen at Claremont, in Surrey, is a little over eighty feet high, and has a trunk six feet in circumference. The growth is very slow, the timber close-grained and hard, the annual layers of woody fibre being exceedingly compact. This fineness of grain, its whiteness and its beauty when polished, render it of great service in carving and inlay work. It has also been extensively used in the place of box for wood-engraving, and for the blocks used for engraving the patterns of calicoes and wall-papers. It would no doubt be still more extensively used than it is did not its rarity render it so costly, as, though holly bushes are plentiful enough, the owner of a fine tree is generally loath to have it cut down. The chief

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use of the holly is in the formation of hedges, as its formidable spines, evergreen foliage, its slight attraction for insects, and closeness of growth, are all valuable recommendations; we often thus meet with it in old-fashioned gardens. "Is there under heaven a more glorious and refreshing object of the kind than an impregnable hedge, of 160 feet in length, 7 feet high, and 5 in diameter, which I can show in my poor gardens at any time of the year, glittering with its armed and varnished leaves? It mocks at the rudest assaults of the weather, beasts, or hedge-breakers." This hedge, the pride of John Evelyn's garden, did not prove so impregnable to the hedge-breaker as its owner fondly thought, since one of the great amusements of the Czar Peter, during his stay with Evelyn, was to trundle a wheelbarrow through it, to the ultimate ruin of the hedge and the no small sorrow of its hospitable owner.

A variety of holly having yellow berries is sometimes met with. Some little while ago, a branch with bright orange-coloured berries was exhibited at one of the meetings of the Linnæan Society, a scion of the yellow-fruited variety having been grafted on a scarlet-berried stock, with this curious result. The holly may also sometimes be met with having variegated leaves, the normal dark glossy green being blotched with a clear yellow or white. The lower leaves of the tree are edged with sharp spines, while the upper branches have the foliage quite free from these:—

"Below, a circling fence, its leaves are seen
Wrinkled and keen;
No grazing cattle, through their prickly round,
Can reach to wound;

But as they grow where nothing is to fear,
Smooth and unarmed the pointless leaves appear."
SOUTHEY.

Ornamentally, the holly may be met with in a glass quarry in Brandeston Church, Suffolk; also on a mediæval flooring-tile in the British Museum. We are not aware of any other ancient examples of its use, though doubtless those given do not exhaust the list. We trust, should another edition be called for, to be able, by further investigation, to remedy this shortcoming. The name holly is a corruption of holy, and alludes to its connection with Christmas. In some of the old herbals it is written "holy tree," while in some countries this connection is rendered still more emphatic, the German name being *Christdorn*, the Danish and Swedish, *Christorn*.

The next subject we have chosen as an illustration of the adaptability of our native plants to the purposes of the ornamentist is the HOP (*Humulus lupulus*). Though we do not recall any example of its use in the ornament of the past, except in one of the capitals at Southwell Minster, it nevertheless appears to us a plant well deserving of a place in our columns. Its climbing habit, the beauty of the leaves, and the size of the cones, are all features which in an especial manner seem to fit it for the service of the designer; and it appears curious that, while so great a choice was at the disposal of the old carvers, they practically left so large a field untouched. Our architecture, for instance, abounds with details of oak, maple, and hawthorn; yet the nut and the wild rose, plants at least as striking and as common, occur but

rarely, while the hop, bindweed, blackberry, and many others, seem to have been almost entirely neglected. The hop is found in a truly wild state in our hedgerows and copses, its weak stems,



Hop.

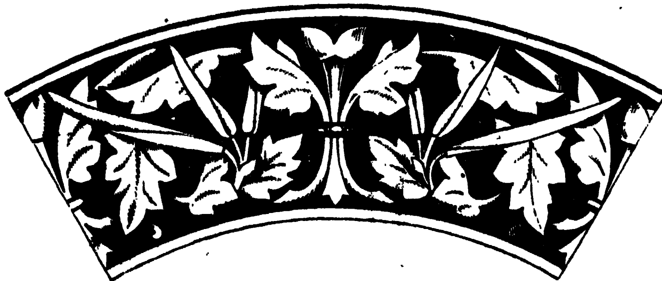
powerless to support themselves, trailing a long distance, and running up any tree or other support with which they may come in contact, and wreathing it with their beautiful clusters of foliage and fruit. It is also largely cultivated in England, France, Bel-

gium, and Germany; its tonic properties, and the fragrant bitter principle found in it, chemically termed lupuline, being, it is almost needless to say, utilised in the making of beer. It was thus first used in the reign of Henry VIII., before that time the fresh top shoots of broom being employed to give the desired bitterness. The young shoots are in some parts of the country cooked and eaten like asparagus. Gerarde, writing in the reign of Elizabeth, says, "The hop joyeth in a fat and fruitfull ground, also it groweth amongst briers and thornes about the borders of fields. The flowers are used to season beere or ale with, and too many do cause bitternesse thereof, and are ill for the head. The manifold vertues of hops do manifest argue the wholesomnesse of beere, for the hops rather make it a physicall drinke to keep the body in health, than an ordinary drinke for the quenching of our thirst." The leaves of the hop are sometimes heart-shaped, at others divided into three very distinctly marked lobes, in either case the margins being deeply serrate. The order to which the hop belongs includes many plants useful to man, as, for instance, among several others, the hemp, mulberry, fig, the *Urostigma elasticum*, yielding india-rubber, and the bread-fruit tree.

About forty million pounds weight of hops are annually employed in brewing in England. Kent and Surrey are the chief means of supply, though those grown in the rich soil of the Vale of Severn, in the neighbourhood of Worcester, are by no means inferior to the best Kentish. The crop is a very speculative one, the dangers which surround it being legion; the profits are, however, so great that the grower is reimbursed if

one crop in three should turn out well. The hops grown in the neighbourhood of Farnham command the highest prices. The etymology of the word is unknown; the Germans term it *Hopfen.* Hops have been cultivated in Germany from time immemorial, and it is from thence that we derive both the plant and its name. Drawings of the natural growth will be found in E. B. 1284, S. C. 41; T. N. O. 125; and P. F. 4.

The YELLOW-HORNED POPPY (*Glaucium luteum*) will no doubt have attracted the attention of many from the peculiarity of its

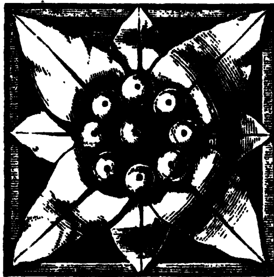


Yellow-horned Poppy.

habitat, growing and flourishing as it does by the seashore, where little else appears to thrive, and by the delicate green of its foliage, the brilliant yellow of its blossom, and its spreading growth, covering large expanses of the shingly beach with a very striking and beautiful carpet. The pods, a highly ornamental feature, may occasionally be found almost a foot in length, and, together with the form of leaf and locality of growth, effectually distinguish it from the yellow Welsh poppy (*Meconopsis Cambrica*). The scarlet-horned and the violet-horned poppies, allied species,

are both exceedingly rare in England: the latter, from its finely-cut leaves and size of the flowers, is well adapted to art-purposes. The yellow-horned poppy will be found in flower from June to October. Drawings of it occur in E. B. 66; P. F. 91.

IVY (*Hedera helix*). We have already, in speaking of the ground-ivy, dwelt to a certain extent upon the characteristics of the present plant, and, from its abundance and conspicuous appearance, any lengthened descriptive details must be unnecessary, as there can be but few to whom the ivy is not perfectly





Ivy.

familiar. We meet with it upon old buildings, rocks, and in the woods and hedgerows, running over the surface of the ground, or covering the trunks and main branches of the trees with its interlacing stems and masses of rich foliage. Opinions have been very varied as to whether the luxuriant growth of the ivy is detrimental or not to the trees which it embraces; for while some have considered that its presence is a benefit, and particularly in severe winters, others have held that the compression caused by the long and closely adhering branches impairs the

vigour and stunts the growth of the tree. The belief that the ivy, like the mistletoe, draws its nourishment from the tree is now no longer held, as it has been satisfactorily proved that the so-called rootlets (or, as they are perhaps more expressively termed by De Candolle, *crampons*) which we see thrown out from the clinging stems do not drain the sap of the supporting tree, but must be regarded as a beautiful mechanical contrivance to aid, by their support and grasp, the ascent of the ivy. We find that these little bodies are equally developed where masses of rock



Ivy.

have to be scaled, and that the plant thrives with equal vigour where support is clearly their sole function; and if, on the other hand, the ivy runs upon the ground, the *crampons* are not developed, as no such supporting members are then needed. The ivy is one of the plants indigenous to Britain, and derives its familiar name from the Anglo-Saxon *ifig*. Considerable differences of opinion have been held as to the meaning of the generic name, *Hedera*: the best derivation appears to us to be that which assigns as its origin the old Celtic word for rope or cord, *hedra*,

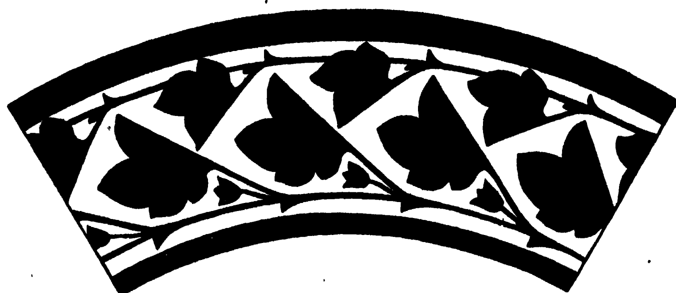
as it exactly expresses the characteristic appearance of the growth. The ivy flowers during October and November, a time of the year when but few other plants are in blossom; hence it becomes the favourite resort of various insects, while the berries are fully ripe by March, and afford a welcome food for the blackbird, missal-thrush, wood-pigeon, and many others, at a season when, from the scarcity of other food, they become peculiarly acceptable. The Romans dedicated the ivy to Bacchus, and in their sculpture he is generally represented as crowned by an ivy wreath, from an old belief, mentioned by Pliny and others, that the plant thus worn neutralised the intoxicating effects of wine. The leaves of the ivy vary very considerably in form, a feature which the ornamentist will appreciate. The leaves upon the flowering branches are somewhat egg or heart shaped, with a very acute point, the more familiar ornamental form of the five-lobed leaf not being found upon this portion of the plant; hence it is perhaps scarcely legitimate to employ the berries with the five-pointed form of leaf, though in the introduction of the plant in the ornament of the Middle Ages this was entirely disregarded. The ivy was one of the favourite plants of the mediæval ornamentist. Examples of its use are very numerous: of these we need mention but a few. We find the leaves and branches alone introduced; for instance, in wood-carving in the stalls of the choir of St. Margaret's Church, Lynn; in stonework, as a crocket, in the Chapter-house, Wells; as the foliage of one of the capitals in the choir of Lincoln Cathedral; and in a beautiful example at the springing of an arch at the Minster, Southwell. We find

the berries introduced with the leaves (in every case the leaf having five points) in a hollow moulding in the cloisters at Burgos in a particularly beautiful manner; and in Paris on one of the capitals of the Sainte Chapelle, and again in a similar position in the chancel of Notre Dame—the first of these being twelfth-century work, and curious from the very acute form of leaf employed; the second dating from the fourteenth century. A very good English example may be seen in a spandrel in the Chapter-house, Southwell. In ancient art we find the Egyptians representing Osiris as bearing an ivy-wreathed *thyrsus;* and upon the Greek and Etruscan vases preserved in the British Museum we frequently see running bands of ornament which we can have little doubt are based upon the ivy: in most of the examples the berries are introduced together with the heart-shaped form of leaf, though in a few cases a three-pointed or a rounded form of leaf, still distinctly ivy-like in character, is substituted. Refer to T. N. O. 71; G. O. 93.

Our next illustration is derived from the IVY-LEAVED SPEEDWELL (*Veronica hederifolia*), a plant of frequent occurrence, but which, from its weak trailing habit and small size, may very easily be overlooked. It may generally be met with on hedge-banks, and flowers freely from March to August with a delicate pale blue bi-symmetrical blossom. Drawings of the ivy-leaved speedwell will be found in E. B. 940; S. B. 184.

Several of the veronicas are well adapted, from their grace and delicacy of form, to the purposes of ornamental art, the brooklime (*V. beccabunga*) and the germander speedwell (*V. chamædrys*)

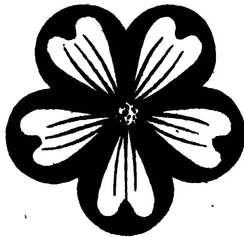
being especially good. The flowers of all the species are bi-symmetrical in form. The germander speedwell is by some writers supposed to be the true forget-me-not.



Ivy-leaved Speedwell.

The MUSK MALLOW (*Malva moschata*), and the COMMON MALLOW (*M. sylvestris*), the subjects of our next illustrations, are both common plants, the musk mallow being frequently met with, and more especially on gravelly soils, while the common mallow, though rare in Scotland, is abundant throughout England on all kinds of ground. The flower of the common mallow is of a pale purplish tint, with the veins of a darker purple: a very rare variety has been met with, having the flowers of a pure blue. The leaves are round in general outline, but deeply lobed into five or seven divisions, and in olden time, before the introduction of many of our present vegetables into England, were a common article of diet. This, together with the musk mallow and the marsh mallow (*Althæa officinalis*), possesses considerable medicinal repute, the whole plant being mucilaginous and demulcent in character. The roots of the Althæa boiled in water, will yield

one half their weight of a glutinous matter, of great value from its emollient qualities; the leaves and fruit will also yield it, but in a lesser degree. The virtues of the family have long been recognised. Pliny held that whosoever should take a little of the extract should throughout that day be free from all fear of disease. Dioscorides considered it a sure antidote in cases of poisoning; while Hippocrates taught that its soothing action especially fitted it as a vulnerary. The flowers of the musk mallow are very large, and of a pure and delicate pink, the leaves



Common Mallow.



Musk Mallow.

very deeply divided, a feature distinguishing it from all the other British species of mallow. Its English name is suggested by the slight musky smell of the foliage if pressed in the hand. The *Malvaceæ* are chiefly tropical plants; about six hundred species are known, almost all possessing the mucilaginous character of our British species, many yielding in addition a valuable fibre, and some American and Asiatic species producing the well-known cotton, a filamentous substance enveloping the seeds. The hollyhock of our gardens also belongs to this family. The generic name, *Malva*, is derived from a Greek word signifying to soften,

in allusion to the soothing effect of the greater number of the genus, while the English name has clearly descended from the Anglo-Saxon *malu.* Drawings of the common mallow may be seen in F. L. vol. ii. 51; M. B. 54; P. F. 1; V. W. 393. The musk mallow will be found in F. L. vol. iv. 50; T. N. O. 23.

The MAPLE (*Acer campestre*) is generally met with as a small hedgerow tree throughout England, but it is not common in



Maple.

either Scotland or Ireland. The wood, though small in section, is often very beautifully veined, and thus becomes of service for furniture, inlay, &c. The bark is exceedingly rough, full of deep

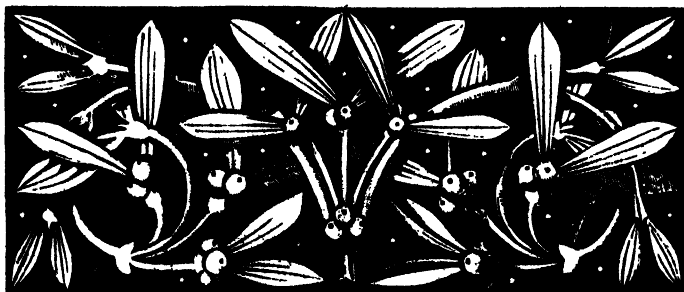
furrows, and very much resembling cork in its appearance. The fruit is winged. The specific name, *campestre*, refers to the localities in which the plant may be found, the open fields; while the generic name, *Acer*, sharp or hard, in Celtic *ac*, has been bestowed upon it from the toughness of the wood. It was extensively used by the ancient Britons in the fabrication of weapons of war—spikes, spears, and lance handles. The English name evidently descends from the Saxon *mapul-dre*. We thus in these few words, *Acer campestre*, the maple, learn where the plant is to be found; one of its striking features, the hardness of the wood; and also, from its Saxon name, the fact of its being one of our indigenous shrubs. This has, from the beautiful forms of the leaves and fruit, been largely introduced in mediæval work. It occurs, for instance, very beautifully treated, as one of a series of small spandrels in the stalls of Lincoln Cathedral, and again in a spandrel in the choir of Winchester. On the Continent two very beautiful examples of it are seen in hollow mouldings in the cathedrals of Evreux, and of Notre Dame, Paris. All these specimens are of the fourteenth century. Drawings of the natural growth may be seen in T. N. O. 30; P. F. 26; G. O. 94.

King-cup, or Marsh Marigold (*Caltha palustris*), a plant by no means uncommonly met with in marshy ground, water-courses, and such-like localities. It may frequently be found in tidal streams, growing in such a position that at high tide it is completely covered; we have thus seen it by the side of the Thames, flourishing in great vigour and beauty, and at full tide swaying with the force of the stream at a depth of from one to two feet

from the surface. In such situations the plant grows with luxuriance, and from the large size and brilliant yellow of its star-like flowers, the vigorous growth of the rich green foliage, and the long succulent stems, it becomes a striking feature even in the mass of bold healthy vegetation so commonly found by the edges of a water-course: these, therefore, are the characters which, in embodying the plant in any design, we must endeavour to enforce. We are unacquainted with any early examples of the use of the marsh marigold, except in one page of a fifteenth-century illustration. This is the more curious since the name marigold has reference to its use in the church-decorations of the Middle Ages, upon those days more especially devoted to the festivals associated with the Virgin Mary; we should naturally, therefore, have thought that, thus brought before the attention, its ornamental features would have been perceived and permanently embodied in some capital or spandrel. The generic name, *Caltha*, is derived from a Greek word signifying cup, and expressively points out a beautiful feature in the form of the flower; while the specific name, *palustris*, is drawn from the Latin *palus*, a marsh, and clearly indicates the localities naturally chosen by the plant. The plant will be found in flower in the spring, remaining for a considerable time in full bloom, and from its perennial nature will, when once established in any locality, soon become a permanent addition to the flora of the district. Representations of the natural growth of the marsh marigold will be found in E. B. 40; P. F. 54.

The MISTLETOE—Anglo-Saxon, *mistelta* (*Viscum album*)—is so

well known that it would appear strange that so familiar a plant has been but little employed in mediæval art, did we not remember that its pagan associations had placed it under a ban, The only example of its use that has come under our observation is in one of the spandrels of a tomb in Bristol Cathedral. The natural growth will be found portrayed in M. B. 270; W. H. H., Plate A, Fig. 3; P. F. 88. The lightness of the plant, and its association with Christmas, seem features that render a knowledge of it desirable to the ornamentist. It appears to us a plant capable of very exten-



Mistletoe.

sive use in the various developments of decorative art. We need only mention a few—the backs of playing-cards, earthenware, muslins, chintzes, wall-papers. Many other uses will, no doubt, readily suggest themselves to our readers.

The OAK (*Quercus robur*), while perhaps our best-known indigenous tree, from its wealth of legendary, religious, and historic associations, has also been one of the favourite subjects of the ornamentist, being abundantly found in carving, stencilling, draperies, glass, &c., both in England and on the Continent,

throughout the whole range of the Decorated and Perpendicular styles of Gothic, and the corresponding periods in France, Spain, and Germany, and also afterwards in the various modifications of the Renaissance. To refer at any length to the varied associations surrounding it would be foreign to our present purpose, though its sacred character in the Druidical rites of the ancient



Oak.

Britons, the importance of its timber for the purposes of the shipwright and architect, the commercial value of the bark for use in tanning, leading to the felling of thousands of trees every year, its use in medicine, the bark being a powerful astringent, and an infusion from the galls so frequently found upon the oak being an excellent antidote in cases of poisoning by the tartrate of anti-

mony, are all points of interest or utility in connection with it. It has also been one of the favourite trees of the poets—Dryden, Pope, Cowper, Wordsworth, and many others, having referred to it in their writings; while to the artist the rugged majesty and vigour of the branches in winter, the brilliant bronze red of the early spring foliage, the deep mass of dark green leaves in summer-time, or the fiery glow it bears when touched by the frosts of advancing winter, render it at all times a beautiful and striking object in the landscape. The galls so generally met with upon the leaves of the oak are caused by a small insect, the *Cynips Quercus-folii*, which, by puncturing the leaf and laying an egg in the wound, causes a diseased and abnormal growth of the part: on cutting one of these galls open the grub will generally be found within. The galls chiefly used in medicine and commerce, though similar in their origin, are the work of another little insect on a different and foreign species of oak.

Though the oak is so familiar a tree in our woods and hedgerows, it must at one time, when England was extensively covered by forests, have been still more abundant. We are led to this conclusion from the great number of places whose names, handed down to us from our early history, derive their force and meaning from this abundance: thus Ockham, in Surrey, is literally Oc-ham, the place of oaks, a title which it still well deserves. Ockley, Acton, Acworth, and many more examples, might be cited. Superstition, too, with its usual fertility of invention, has not failed to detect the strange and marvellous in the oak. Of

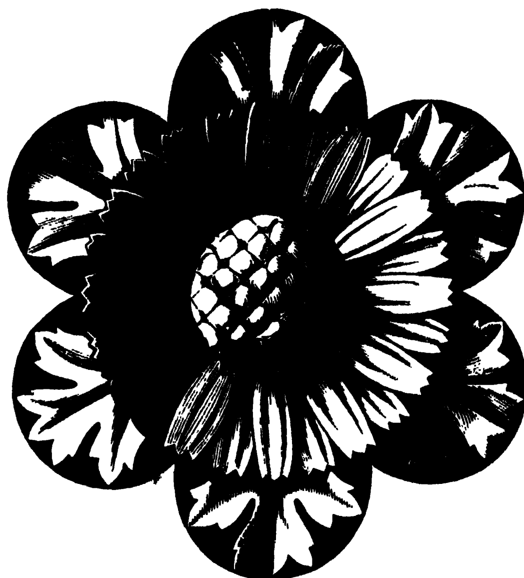
this, did space permit, and were it not somewhat foreign to our subject, we could quote many curious instances.

In the works of the ornamentist, to the best of our knowledge, the *Q. robur* form of the oak has been exclusively used. To give an extended list of the places where illustrations of its use in design occur would be to devote far more space to it than is really needful: as an example of its use in stonework, we would instance a small, but good capital at Ely, where one pleasing, natural, and ornamental feature, the empty cup of the acorn contrasting with the other forms, is very well introduced. We see this same attention to natural detail in some flowing foliage in a hollow moulding at Henry VII.'s Chapel, Westminster: the leaves are so deeply cut into lobes, and so modified in form, that except for the presence of the acorns, we should not recognise the foliage as being that of the oak at all. A very clear and good piece of oak is introduced in some wood-carvings at the ends of the stalls at Wells Cathedral; again, in crockets at Exeter, in the Lady Chapel; in a stone boss, St. Cuthbert's screen, St. Alban's Abbey Church; in wooden spandrels at Winchester, and Northfleet Church, Kent; as a diaper in glass quarries at Fulbourne and Waterbeach Churches, in Cambridgeshire; and as a carving at the arch-springing at Southwell Minster, Nottinghamshire. On the Continent, in Burgos Cathedral, we meet with several exceedingly beautiful carvings of the maple, plane, vine, and many other plants—among them a square panel filled with oak, and a very graceful running band of leaves and acorns round the tomb of Don Juan II.; and in Paris, in the Sainte Chapelle, we also find

a hollow moulding filled with running oak foliage. In the South Kensington Museum many excellent fragments of wood-carving are preserved, and among these the oak is very often visible; while in the ceramic collection we frequently see the borders of the Majolica dishes and plates entirely composed of interlaced branches of oak. The oak is, in this latter series of examples, of heraldic significance as the badge of the Dukes of Urbino. Representations of the natural growth of the oak may be seen in E. B. 1288; M. B. 126; P. F. 9; S. C. 151; G. O. 95; T. N. O. 127.

OX-EYE DAISY (*Chrysanthemum leucanthemum*). The impressions we at once derive on seeing the natural plant are—first, the size and brilliant star-like character of the flowers, as we view it growing amidst the long grass; secondly, the beautiful contrast of form, colour, and light and shade between the deep yellow, convex central portion and the brilliant white and concave rays surrounding it; and thirdly, the comparative smallness and insignificance of the leaves: hence it appears to us that in any adaptation of the plant to the purposes of the designer, these are salient points to be observed. We find it growing very freely in meadows, on the sunny side of railway banks, &c., and, where found at all, generally in great profusion. During the past summer, by the side of the river Wey, we came across a plant that had firmly established itself, and was growing and flowering in full health and vigour in the crown of a pollard willow tree, about eight feet from the ground. It is one of the plants regarded by the farmer with dislike, as it generally indicates great dryness of soil, and,

from its abundance and the perennial nature of the root, can scarcely be dislodged where it has once fairly taken possession. The whole plant varies from one to two feet in height, blossoming in June and July. The garden chrysanthemum is a Japanese allied species, considerably modified by cultivation. It may be



Ox-eye Daisy.

seen painted on Japanese plates, screens, &c. So far as we are aware, the ox-eye seems to have been but little used in ornamental art, the following examples being the only cases of its occurrence with which we are acquainted:—On a label termination to one of the windows in the presbytery, Winchester, where we find the flower in the centre of the boss very clearly and unmistakably

rendered, but surrounded by the ordinary type of leaf of the Early English Gothic period; in some twelfth-century glass at Rheims, where it is introduced as the flower dedicated to St. John, and where, by a poetical symbolism, all the flowers turn towards our Saviour on the cross, as the Sun of Righteousness, the true Light of the world; again met with in the celebrated MS., "The Hours of Anne of Brittany," now in the *Bibliothèque du Roi*, Paris. This illumination dates from the close of the fifteenth century, the flowers introduced being very naturalistic in character, and with their shadows thrown upon a golden ground—a marked characteristic of the illumination of that time. It also occurs in a missal in the Library of the Arsenal, Paris, where, on a golden ground similar to that last cited, detached flowers are scattered over the borders—the pea, iris, heartsease, and many others being represented, and among them the ox-eye daisy. Drawings of the natural plant will be found in S. B. 158; E. B. 714; P. F. 42.

The CAMPION (*Lychnis diurna*) is another plant well adapted to the need of the ornamentist, the form of the flower and the sheathing of the stem by the pairs of leaves being valuable and characteristic ornamental features. The *Lychnis diurna* is to be met with in moist hedge-banks, and more especially those that are shaded by overhanging trees; the flowers are of a delicate pink, scentless, and opening in the early morning; differing in all these respects from the *Lychnis vespertina*, a very similar plant in general appearance, but having the flowers white, with a slight odour, and opening in the evening. The white campion has generally a more robust and coarser character of growth than the

pink campion, and appears to delight in more open situations. By many botanists, however, these two plants are considered as closely allied, the pink campion being regarded as merely a variety of the white, and both referred to as the *Lychnis dioica*. The specific names, *diurna* and *vespertina*, refer to the times of flowering, the morning and evening respectively; while the generic name, *Lychnis*, common to all the species, is derived from the Greek word for lamps, the thick downy covering on the leaves of the white campion having at one time been employed in the

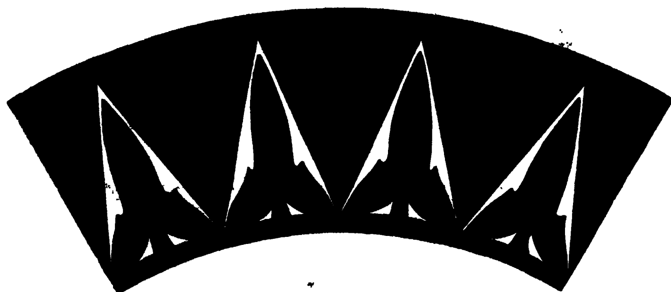


Campion.

manufacture of wicks for use in lamps. Refer to F. L. vol. ii. 32; T. N. O. 69; P. F. 53.

SORREL (*Rumex acetosa*). Though from its inconspicuous character the sorrel may very readily be passed over, it will, we think, be found to repay the attention of the ornamentist, since the lightness and grace of its growth, its brilliant colour, and the rich form of the leaf, are all characteristics that should render it valuable to those engaged in decorative art. The leaves have a pleasant acid flavour, and are occasionally employed in salads.

The English name is derived from the Anglo-Saxon *sur*, sour. The present plant must not, from similarity of name, be confused with the wood-sorrel (*Oxalis acetosella*), as the two plants are very different in appearance, the wood-sorrel having large white flowers, and a beautiful trefoil character of leaf. Illustrations of



Sorrel.

the natural growth of *R. acetosa* may be seen in E. B. 1223; F. L. vol. v. 29; M. B. 69.

The SPEAR-PLUME THISTLE (*Carduus lanceolatus*) has been selected as the subject of our next example. It may very commonly be met with in hedge-banks and waste ground, attaining to a height of from three to four feet, and forming a very ornamental and conspicuous object. Its employment in heraldry with the motto NEMO ME IMPUNE LACESSIT, as the badge of Scotland, is so well known that the mere mention of the fact will suffice to recall it to the memory of our readers; but this application of it, and its frequent recurrence in all circumstances where the national emblems are introduced, render it necessary that the designer should be familiar with the plant he will thus have to treat.

There are several indigenous species of thistle, some one or two of them laying claim to their right to be considered the true Scottish badge, but the balance of evidence will, we think, be found to point to the spear-plume thistle as that most entitled to the honour. The *C. marianus*, or milk-thistle, one of our rarer native, or at least naturalised species, has a particularly ornamental effect from the veins upon the leaves being of a clear milky white, the

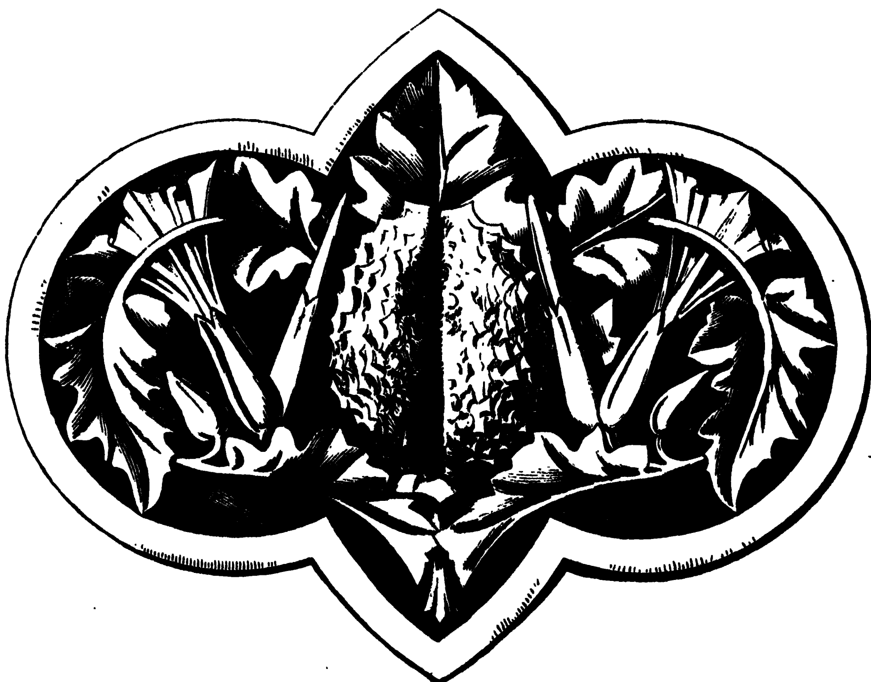


Thistle.

rest of the leaf being of the normal green colour. A drawing of the spear-plume thistle may be seen in E. B. 686.

The THORN-APPLE, though not a common wild plant, may occasionally be met with, growing on waste spots, rubbish heaps by the roadside, and similar places. The large size and brilliant whiteness of the flowers, the bulk and peculiar character of the spiny fruit, make it a very striking object, and admirably fitted for a share of the ornamentist's regard. It is a plant of Eastern origin, and was unknown here until the reign of Elizabeth; we therefore do not find it in any of the art-work before that date, nor, indeed, do we remember to have ever seen it

in any way introduced in later designs: this, no doubt, is partly owing to the comparative rarity of the plant. Its scientific name is *Datura stramonium*, the generic name being derived from *tatorah*, the name of the plant in Arabic. The whole plant



Thorn-apple.

is powerfully narcotic in its effects. In the quaint pages of Gerarde, published A.D. 1636, we learn the history of its introduction into England. Gerarde was the director of the botanical garden of Lord Burleigh; hence he received many rare plants from abroad for cultivation. In speaking of the *Datura*, he says,

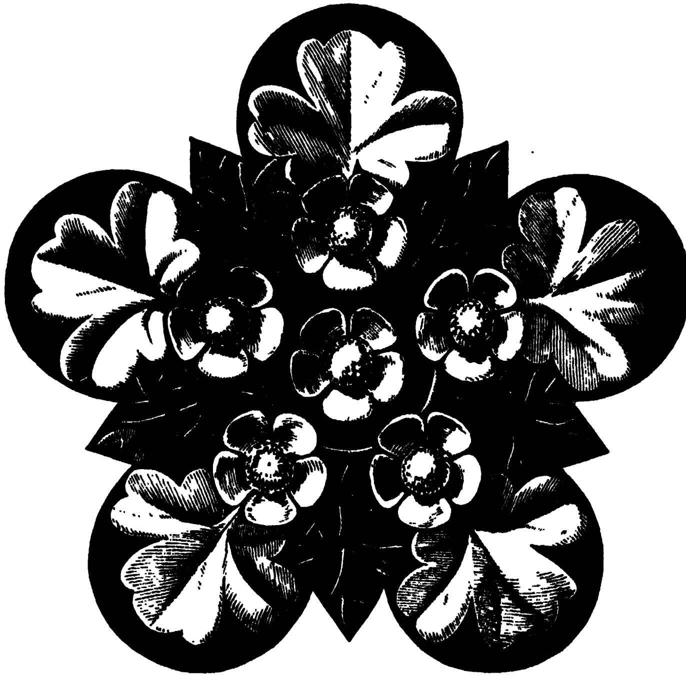
"whose seeds I have received of the Right Honourable the Lord Edward Zouch, which he brought from Constantinople, and of his liberalitie did bestow them vpon me; and it is that thorn-apple that I have disposed through this land." In some botanical works we find it asserted that the thorn-apple was introduced into Europe in the Middle Ages by the gypsies, who, in their wanderings, brought it from Asia; but the declaration of Gerarde is so positive and explicit, that it seems difficult to admit any other belief, more especially as he accompanies his statement by an illustration which, though very rough and quaint, is quite sufficiently like the natural plant to prove that it was not some other species introduced by him and wrongly named. Drawings of the thorn-apple may be consulted in E. B. 935; F. L. vol. vi. 17; M. B. 124; S. C. 6; P. F. 13.

The TORMENTIL (*Potentilla tormentilla*) has already, to some extent, been referred to when speaking of an allied species, the cinquefoil. The flowers, though typically composed of four petals, are frequently to be found with the petals five in number, the calyx in that case being cleft into ten segments instead of the normal arrangement. We are not acquainted with any example of the use of the tormentil in ornament, but the wood-strawberry (*Fragaria vesca*), an allied genus of the same natural order, has a similar form of calyx, the segments being alternately large and small, and twice as numerous as the petals; and this beautiful ornamental feature is very carefully shown in a sixteenth-century MS. at the British Museum, where the plant is introduced in one of the borders. Consult E. B. 430; F. L.

vol. v. 35; or P. F. 94, for illustrations of the natural growth of the tormentil.

Our remaining illustration has been suggested by the WATER CROWFOOT (*Ranunculus aquatilis*), one of the numerous species of buttercups, but distinguished from its allies by the petals of the flowers being white, not yellow, as in the case of the other members of the family, and also from the habitat of the plant, the blossoms being found floating upon the surface of quiet water-courses. The crowfoot may be met with in flower throughout the summer, and, where seen at all, is ordinarily very abundant, so that at a little distance the whole surface of a large pond will tell upon the eye as a mass of white, from the innumerable blossoms thickly scattered over the water. The English name crowfoot has arisen, like many similar names, from the supposed resemblance of the plant, or some portion of it, to some other natural object; thus we get crane's-bill, cock's-foot grass, lark's-spur, bee-orchis, pheasant's-eye, and many other such examples among our common names for plants. As a family, the buttercups must be regarded with suspicion on account of their strongly developed acrid qualities; thus the leaves of the *R. flammula*, if applied to the skin, will, in a very short time, cause large and painful blisters. The *R. acris* is equally poisonous; and the *R. arvensis*, or corn crowfoot, is extremely injurious to cattle and sheep. The *R. aquatilis* does not possess these dangerous qualities; on the contrary, it may be collected and given as fodder in times of scarcity or drought, and the animals will not only eat it, but thrive upon it. It is a very

widely spread species: the placid waters of regions so different from each other in climate as Lapland and Abyssinia are equally favourable to its growth, and the lakes and slowly running streams of California are powdered over with its brilliant blos-



Water Crowfoot.

soms, as we see them in our English pools. The water crowfoot affords us also a beautiful example of that adaptability of form to the circumstances of the plant's existence which we may so frequently trace in the works of nature. It will be noticed in the illustration that two very distinct forms of leaf are re-

presented; and, on examining the natural plant, it will be found that the simpler form of leaf floats upon the surface of the water, while the lower and more minutely divided leaves are submerged. Imagine the respective positions of these leaves reversed, and it would speedily be apparent that the finely cut leaves were unable to support the blossoms, and to expose them to the vivifying rays of the sun, while the simpler form of leaf would, by the action of the water, speedily be torn into long shreds, the principal veins alone remaining, and very much resembling the actual form that we meet with in the case of the submerged leaves. In employing the water crowfoot in ornamental art, it appears to us that the two great features most highly characteristic of it, and therefore to be embodied in a design, are, first, the number of its blossoms; and, secondly, the two distinct kinds of leaf; the simpler form being the most prominent, but the other, though subordinate, as in the case of the natural plant, to be indicated, and its presence felt. The *R. bulbosus* is the species so frequently met with in the carvings of the Decorated period of Gothic art, an especially beautiful example of its use being seen in a capital in the doorway in the Chapter-house at Southwell Minster, Notts. The *R. aquatilis*, so far as we have had opportunity of observation, appears to have been entirely overlooked. Illustrations of the water crowfoot will be met with in V. W. 95; E. B. 18.

Having thus briefly indicated some few points of interest in the foregoing British plants, we draw our remarks to a close; it must not, however, be supposed that all the material at our

disposal was exhausted. We fear rather to weary the reader than to exhaust the stores which nature affords; hence we limit our remarks to fifty plants, leaving many equally valuable ones untouched; such plants as the bird's-foot trefoil, chicory, cowslip, forget-me-not, meadow vetchling, silver-weed, and stork's-bill, being fully as well adapted to the various purposes of ornamental art as those we have, in the body of our text, referred to; in fact, the whole of those just mentioned were, together with many more, indexed as a portion of our plan, and were only cut out when it was found that a catalogue thus amplified would stretch to an inordinate length. Though we have, in the course of our remarks on each plant, been careful to indicate to our readers the books he should consult for illustrations of the natural growth of the flower in question, we cannot conclude without again strongly advising the designer, wherever it is at all practicable, to go direct to nature, as a series of sketches of even the roughest character has an ornamental value and variety which are not always found in book-illustrations, and, moreover, the knowledge of the plant acquired in actually delineating it is worth far more than any study of the written descriptions of others. These sketches should of course be made when the plant is available, and not left till an emergency arises, and when, very possibly, the plant, if found at all, may not be in satisfactory condition for ornamental work. Whenever, therefore, a plant possessing valuable properties for decorative work is met with, a drawing of the general growth and enlarged details of its more artistically valuable parts should be made and stored up for future use. A designer cannot

have too many such reserves of material, though he may very easily have too few. Those who have never fairly searched may, however, be under the impression that but little practical good could come of any such seeking, as, for want of experience, they unknowingly underrate the wealth that, at the expense of a short railway journey into the country, is theirs for the gathering. To test this we set out one day in June, and the result of a stroll of barely two and a half hours was conclusive on this point. In addition to many plants in seed, or which, from their foliage, were worthy of introduction into art-work, no less than seventy-four were met with in flower; many of these, as the dog-rose, blackberry, white bryony, comfrey, mallow, hawthorn, and silver-weed, being excellent for carving; while the bladder campion, forget-me-not, meadow cranesbill, ground-ivy, meadow vetchling, cinquefoil, oxalis, and honeysuckle, would be valuable for lighter work—muslins, papers, or lace. We cannot doubt that the interest thus evolved from a direct study of nature would be a growing one; that not only would the actual result in art-work be the better for it, but also that the enjoyment derived from the study would be such as to render the pursuit one of far more interest than those who have not yet experienced it can realise.

"Happy is he who lives to understand,
Not human nature only, but explores
All natures—to the end that he may find
The law that governs each; and where begins
The union, the partition where, that makes
Kind and degree, among all visible beings;

The constitutions, powers, and faculties,
Which they inherit—cannot step beyond,
And cannot fall beneath; that do assign
To every class its station and its office,
Through all the mighty commonwealth of things;
Up from the creeping plant to sovereign man.
Such converse, if directed by a meek,
Sincere, and humble spirit, teaches love:
For knowledge is delight; and such delight
Breeds love; yet, suited as it rather is
For thought and to the climbing intellect,
It teaches less to love than to adore:
If that be not indeed the highest love."

WORDSWORTH.

II.

SEA-WEEDS AS OBJECTS OF DESIGN.

By S. J. MACKIE, F.G.S., F.S.A.

SEA-WEEDS AS OBJECTS OF DESIGN.

I.

AS in the world of human life, so in the world of nature—from the humblest and meekest the greatest lessons may be learned; and there is often as much worthy of admiration and study in the neglected as in the known and appreciated. The pure metal lies not on the surface, but the gold is extracted from the solid rock, or picked up, after much labour, among the common sands; and many things lie out of the beaten path from which the artist and the student might gather fresh fancies. Twice a day rises and falls the great tide of ocean, and its heavings were not less constant when the trilobite and astrolepis were inhabitants of primordial depths; still twice a day it ebbs and flows, and the stony mountains have treasured the fragments of the weeds it plucked from pre-Adamic shores in memory of its ancient toil.

Bright are the flowers of the earth, the first and choicest of ornaments. Pure, simple, and holy, their charms can never decay, though familiarity and inconsistency may vulgarise, and innumerable misappropriations make us sometimes wish for the contrasts that other less showy objects would afford. While the fields

are radiant with their beauty, and the gentle zephyrs fragrant with their scented odours, the great tide ebbs and flows over the flowerless plants of the sea. Around the huge rocks the perennial fringes of olive fuci undulate in graceful folds among the swelling waves, and the tall tangle bows its pliant stem as

"The ocean old,—
Centuries old,—
Strong as youth, and as uncontrolled,
Paces restless to and fro,
Up and down the sands of gold."

For ages have the weeds of the sea been heedlessly disregarded or despised. The vilest epithet the polished Roman knew was *alga projecta vilior*. Horace, too, wrote *alga inutilis*; and there may yet be many to exclaim with the Scòtch professor of the last century, "Pooh, pooh, sir! only a bundle of sea-weeds!" But when the apostle Peter slept at the house of Simon the tanner he dreamt a great dream—a dream memorable to the end of time—a dream that was a waking truth to be set in golden letters, and engraven on the hearts of rich and poor, wise and unwise—"There is nothing common nor unclean."

The Chinese believe there is one word expressive of all excellence, so exquisite that no one can pronounce it, although it can be written and perceived by the eyes. That word is stamped alike on "the vile sea-weed" and on the lovely flower. I do not claim for both an equal rank,—the cottage may be charming, and not vie with the palace; and "the pride of the village" may want the grace of "the ladye of high degree,"—but I do claim for the

neglected vegetation of the seaside an elegance of form and structure, a suggestiveness of mathematical designs, a poetry of association and typical expression, a simplicity and modest gracefulness, which will entitle it to the best consideration of the designer.

World-wide in distribution, the sea-weeds are accessible to every one; and it is not the rarest that are, for ornamental purposes, the most valuable. The beauty of a manuscript tempted England's greatest monarch to the acquirement of letters, and the commonest weed may be the incentive to the perusal of one of Nature's choicest books. Wherever the briny waters wash the coasts, in marshes even where the salt sea penetrates but seldom in the year, on rocks and stones, and piers and piles, winter or summer, from the land of gold to the Canaries, from the soil of the Hottentot and Caffre to the ice-bound country of the Lapp, from the floating meadows of the tropics to the snowy regions of the poles—there grow the crisp sea-weeds—there may be gathered in endless variety the chastest patterns of simplicity. All the associations of the sea are grand and glorious, and the goddess of beauty came from the foam of its waves. In the sublime language of ancient mythology, the Ocean was the first-born of Heaven and Earth, that was wedded to the child of the land and the sky. Are there no gems of classic imagery in the bronzed belt that girdles its giant form? Have the thousand daughters of Atlas and Tethys all taken to groves and cities, and have the Nereides become the attendants of Flora? Are the tears of Calypso and the loves of Amphitrite forgotten? Has the memory of Sappho

passed for ever away, and have the green and olive nurslings of the surge no affinity with the crystal phœnix that arose from their ashes in the Phœnicians' fire?

There is a point whence life and vegetation seem to diverge—the simple cell; where the algæ meet the monads, and most mysterious processes and elaborations are carried on by means the simplest but most astounding. Of cell upon cell are the sea-weeds built, and by cells or spores cast loose from their substance are their species reproduced, as certainly and as surely as plants by the marriage of the flowers. Of cellular tissue entirely does the sea-weed consist; of cell upon cell alone is woven all the varied drapery of the deep. A mere sac, empty, or containing a fluid or granular substance, absorbs the surrounding fluids, assimilates them in its membranous walls, consolidates their carbon and nutritious substances, grows, divides, each portion swells again to its parent size, each again divides, and so the splitting cells increase and multiply. The rapidity with which some of the common confervæ of our ponds are thus developed is well known; and it is not unusual to find loathsome pools, that were black at dawn with decomposing filth, covered at eve with a floating verdure rapidly and energetically extracting its nutriment out of the pollution, and liberating the gas of animal life—oxygen—into the atmosphere, in lieu of pestilential effluvia. The snow-plant, the *Protococcus nivalis*, is perhaps the best-known instance of the rapid development of cell-plants properly so called. In a few hours whole tracts of the white snow of northern lands will assume the hue of the battle-field; and from another species

the waters of the Arabian Gulf have acquired their memorable name of Red Sea.

Above the limits of the lichen incrusting the peaks of mountains, and in the unplumbed abysses of the deep below the region of the nullipore, there the cell-plants swarm by myriads; and even the air powders the ropes of ships at sea with the atomic dust that had vegetated among the clouds.

I have claimed for the sea-weeds the attractions of simplicity, and I claim beauty of outlines and gracefulness of forms even for the simplest of the simple—the cell-plants. Forms! outlines of cell-plants! Would not a single species content the naturalist? The ever-varying Hand that is traced in all around has touched these lowly objects with charms and wonders in the most exquisite modifications of form and the most delicate sculpture. The invisible is not the less beautiful that it is unseen; the physician owes much to these little things—why not the artist? Are there no laws of symmetry in natural objects, as there are of mechanics and of force? no sympathetic principles of harmony of colour with form, as of structure with locomotion or fixity? Even in these humble plants there are traces of that divine delicacy which may be observed and appreciated—an expression of that one word which cannot be spoken.

For the present attention is confined to those forms of algæ which exhibit the second stage in the development of vegetation — the linking of these cells, or cell-plants, together, which is naturally effected by their self-division and growth, without actual separation of the parts. And here the transitions

exhibit those almost insensible gradations which have led some powerful minds to view the highest structures, and even intellectual man, as the consummation only of previous states and changes. But whatever ideas may be entertained of the manner by which the creative energy has worked, the results and the power, the ends and the means, are alike astounding, whether the monad or the cell were elaborated into the animal or the plant, or both were produced by a thought to fulfil their purposes in the economy of life. The globular membranous sacs or cells divide in a linear direction, and a string of the tiniest beads results. In the cylindrical cell—for the forms of the cells are in themselves various, both naturally as well as by the exercise of mutual pressure and other influences—a transverse partition is formed; the two ends are produced; in each of these again the same process is repeated, and a thread-like species is formed. Other globules adhere side by side, developing the membranous expansions of cellular tissue, in which we recognise the first appearance of the leaf. In the clinging together of the cylindrical fibres we perceive likewise the first rudiments of the branch and stem: in such cases, when the elongated cells of the fibres are of an unequal length, a continuous stem or cord is produced, varied only as it is enlarged or swollen by the methodical aggregation of greater numbers, or tapering by the prolongation of the central threads beyond the rest, or by the less robust condition of the young cells.

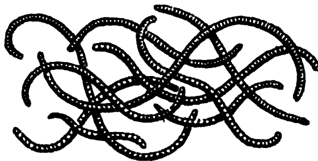
If the cell-cylinders are of *equal* length, nodes and internodes, like the joints of a reed, are produced; and by the bifurcation of

the cells of the extremities branching, fronds and ramuli result. Thus by this cell-splitting are formed the delicate branching forms of the rhodosperms (red sea-weeds), the paper-like membranous expansions of the ulvaceæ, the jagged fronds of the fuci, and the stout trunk of the gigantic lessonia. Thus the progress of the general plan, from the conception within the ovule, is traced, species by species, and genus by genus, until we pass ashore with the zostera and a few other similar borderers, and ascend through the mosses, ferns, and grasses, to the flowering plants and trees, and reach the summit of the second organic kingdom, where mind alone seems wanting to complete the conditions of life. Indeed, were it not for the perfection of all things around us, we might regard the formation of beautiful flowers and massive trees as arising from an imperfection—namely, the incomplete separation of the primitive cells in their self-division—and that Nature had turned the hint to most admirable and wonderful account, that she had improved upon it, and not only joined firmly together the sides of the connected cells, but in many of the thread-like species had enclosed them, for their better protection from disjunction, in gelatinous or mucous cylindrical sheaths, which may be fancifully, if not really, regarded as the first symptoms of the cuticle or bark. Most of the filiform algals are fresh water, but many of them are marine; and among the tufts of confervæ in brackish pools, or the floating scum on the surface of polluted water, along the muddy sides of ditches, as well as coating damp rocks and spray-splashed cliffs, upon decaying heaps of sea-wrack, on floating planks drifting ashore

in fleecy masses, or bearding with silky hairs the fronds of the sea-weeds themselves, we shall find abundant illustrations of such primitive types for our present purpose—that of slightly tracing some of the variations and adaptations of particular parts and organs by which Nature effects the beautification of the objects themselves.


Oscillatoria nigro-viridis.

Nor as we regard these objects under the microscope—for it will require the high powers of that instrument to develop their minute structure—can we avoid being struck with the elegance of the twistings and contortions, the lacings and interlacings, of even the most simple threads, as they congregate and combine to form those dense masses, velvety tufts, or hazy films by which their myriads are made evident to the human eye. The development of certain cells into spores,


Oscillatoria spiralis.

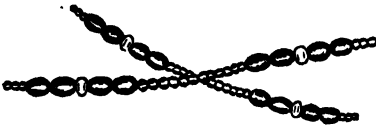
and the wonderful generative processes by which the algæ are propagated, belong, however interesting, more to the domains of natural history than to our present inquiry. Suffice it to say that, by the impregnation of the endochrome of one cell by that of another, the spores—or seeds, as for expressiveness they may here be termed—are produced by the granulation of


Calothrix semiplena.

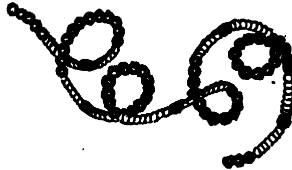
the mixed matter. Now, in the different aspects and conditions of these spore-cells arises that first divergence from the mere thread of beads by which Nature, while she retains the principle and object of the organ itself in its adaptation to special conditions,

seems to vary in every possible manner and way, not only in form and sculpture, but often in colour, her most primitive organizations. Even the contraction of the endochrome itself, in the granulating process, by the production of intermittent vacant spaces, adds a pleasing variation to many of these moniliform filaments.

In some species of this class the continuity of the congregated

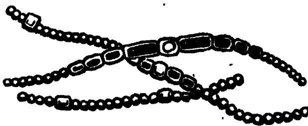


Sphærozyga Berkeleyana.



Spermosira Harveyana.

cells is interrupted, besides by the spore cells, by a connecting cell, or heterocyst, differing in form from either, and not unusually of an entirely opposite and contrasting colour. Such is the case with the *Spermosira Harveyana*, a very minute species of nostoc,



Sphærozyga Carmichaelii.



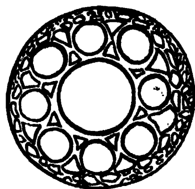
Sphærozyga Thwaitesii.

found on dead leaves in the summer month of June. The rudimentary cells of its exquisite curved filaments are small cylinders, the spore capsules completely spherical, and the heterocysts subquadrate, inclining to oval. The colours vary in each, and are in the first of a translucent bluish green,—of

course, therefore, the prevailing hue,—which is charmingly relieved by the deep brown of the second and the pale pink of the last.

These constitutional forms, in their varieties and adaptations, their manner of growth and development, constitute the entire structure of the whole tribe of sea-weeds; and therefore we ought to find the chief features of any elegance these humble forms possess continued and elaborated, as they really are, in the more complex conditions of the higher fuci. In the sections of the sea-weeds, therefore, even as made for the scientific elucidation of their structure, we may expect to find, as we undoubtedly shall do, many hints and lessons.

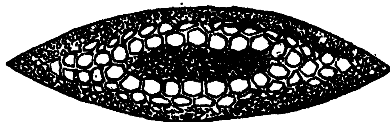
The true form of the cell is perhaps the globe, but it is more commonly presented to us as the cylinder, the conditions and outlines of which are varied almost *ad infinitum*, as by the various effects of growth and pressure the cells are forced into hexagons, pentagons, and other mathematical shapes, or their lines of junction are disposed in undulating tracery of the most elegant and intricate patterns.



Magnified Transverse Section of Arthrocladia villosa.

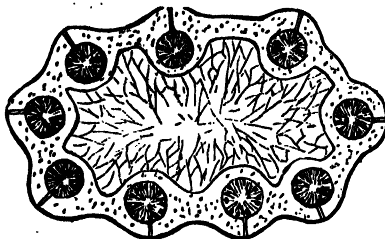
Of the few sections we have engraved as illustrations, the first is that of a pretty knotted sea-weed, rather rare, but still not uncommon on the southern coasts of our island in the summer and autumn seasons—the *Arthrocladia villosa*. Around the tubular axis the larger rings are disposed,—to which circle upon circle of the smaller succeed to the verge of the periphery, yielding to the forms of the intermediate cavities in

numerous appropriate shapes. In the second we have given a cross section of the compressed frond of the *Desmarestia ligulata*, an inhabitant of the tidal pools at extreme low water on most parts of our coasts. An internal jointed tube passes up the centre of the frond, and gives rise to the obscure midrib perceptible on the surfaces of the sides; on either side the larger cells are disposed in two opposing flat arcs, and compressed into shapes more or less hexagonal, outside of which, in the second row, the pentagonal form prevails, and then the intermediate exterior and interior spaces are filled by smaller cellules of more irregular outlines.



Magnified Transverse Section of Frond of Desmarestia ligulata.

The third section is made across one of the spore-bearing receptacles which tip—as yellow warty excrescences—the flat olive fronds of the common bladder-weed, *Fucus vesiculosus*, so common in dense meadows everywhere on our shores. The interior, filled with mucus, is traversed by a network of jointed fibres, which communicate with the spherical conceptacles immersed in the outer substance, and containing the spores and the antheridia. That there are other and many sections far more intricate and beautiful any one can testify who has ever turned over the fine plates of Professor Harvey's "Phycologia Britannica,"



Magnified Transverse Section of Spore-bearing Receptacle of Fucus vesiculosus.

his admirable papers in the publications of the Smithsonian Society, or the noble folio volume of Postel and Ruprecht; but in these simple ones here given—and selected on that very account—we find Nature contriving elegant and pleasing devices by the mere repetition and combination of the circle, the hexagon, or the pentagon, and producing by such means a pleasing unity and richness of effect instead of a sameness or a poverty. At any rate, whenever Nature does produce a beautiful object, we shall never be the worse for examining the principles by which she has worked, and it is in the least complicated that we must first hope to find the rudimentary laws of her beauty-building. With rule and compass we can excel her in accuracy—with reason, experience, and remembrance, we can improve upon her labours in our artificial productions; but, notwithstanding the many exquisite objects of art produced by our modern jewellers, there is by far too much conventionality and routine in the more ordinary bijouterie of every-day wear; and we might from such sections alone acquire many novelties in the setting of gems, pearls, and pebbles, as well as gain many advantages over the arbitrary whims of an unguided, although it may be a cultivated, mind. Not only might the real be thus improved by adopting the mathematical solids or traceries thus suggested, but there are numerous articles of mock jewellery in which shells, fictitious agates, and inferior cameos are largely used, the designers for which might be advantageously employed for a season by the seaside, where their eyes would become accustomed to the sober olive of the weeds; and it might then be found that a bronze setting

would not only be more truthful, but more useful and chaste, than a hypocritical gilt surface, that reveals at every touch the baser metal beneath. And here, with these few words of explanation and suggestion, for the present let me leave this unworked vein —merely adding that the longitudinal sections are as fanciful as the transverse, and in viewing the latter we may oftentimes imagine we are examining fairy ribands and laces of the most delicate texture.

But however complicated the combinations of the cellular and vascular tissues become as we ascend in the scale of creation, the development of forms and tints in every natural object is as dependent upon fixed laws as the beauty and colouring of a picture on the skill and innate genius of the artist. Few artists, however, if any, work by rule; in their studies they attain instinctively, as it were, a conceptive knowledge of the beautiful; they find Nature ever varying, and they find variety the source of beauty; they find that an object composed of lines contrasts pleasantly with circles; that the upraised hands of a speaker should be opposed by the folded arms of the listeners—the energetic by the prostrate; and so they go on, acquiring a science by perception, of which the more ethereal portion has never yet been reduced to written rules, and is so subtle that perhaps it never will be. That designers work more usually by their innate taste and their manual skill is evinced by the many elegant absurdities that one constantly meets.

And now I would arrest the first objection that could be raised against the sea-weeds as objects of design—their inapplicability on

the ground ot appropriateness. There is an appropriateness, the world will say, about flowers; they have a language of their own, in which they speak the rarest poetry; the saints of all the days of the year have their dedications of these gems of the fields; the nymphs of the forest and dell, the Naiades and mythological celestials without end have patronised them; besides, it is so natural to paper our walls with roses, to have garlands woven in our dresses; and our maidens only deck their hair with the artificial because the real will fade. What more proper than a plate of leaves for fruit, or a decanter ornamented with grapes? True; but what more absurd than a vase of cabbage-leaves supported on the flourishing tails of twisted dolphins; or a jug composed of a gigantic head, from which we pour the contents through the perforated body of a swan, with its neck immersed in a sturdy flag, and of such reversed proportions and of such diminutive size that a whole flock might roost in the interior of an egg, without any of them experiencing that unpleasant inconvenience which nursery rhymes attribute to the old lady who lived in the shoe? These are broad absurdities, although the objects themselves may be elegant and of costly ware: thus showing at once that the grace of natural objects is dependent upon the laws of mathematical form, for there is nothing in the subjects we have noticed to interest—no hidden allusion—and all that is pleasing arises from the lines of contour. But there are more subtle misapplications, which ordinarily escape detection. Is it quite correct to bind the tendrils of the vine round the unpretending jugs which are dedicated to the pure fluid of the

teetotaler, or those that are charged with foaming ale? to defend our butter with a belt of hissing snakes, or pass jets of sweet water through fountains of gigantic cockle-shells and marine monsters? And yet many of these things we constantly forgive; then surely we might extend some of that mercy, if they required it, to the sea-weeds, which we do not withhold from reptiles, especially if it can be shown that they are available for more artistic purposes than for pretty picture-making in albums and herbaria, or for fancy baskets, with a hackneyed apologetic legend, in bazaars.

It cannot be expected that the designer should carry on the laborious researches of the man of science, or make the delicate sections which the naturalist finds necessary for the determination of species and the comprehension of the phenomena of structure



Ulva linza.

and vitality; that he should have one eye for the microscope, and the other for his pencil; nor that the philosopher should have all the accomplishments of the artist; but as the boundless universe is dependent upon everything that exists for its unity and harmony, so art cannot neglect even natural sciences with impunity, for, at least, every branch is capable of adding an expression or a charm. Pardon, therefore, the simple belief that even the rudiments of vegetable structure and the section of a sea-weed or a plant are not unworthy of inspection for artistic purposes, and that they may *suggest*, if not actually exhibit, exqui-



Fucus nodosus.

site combinations of mathematical figures which are not inappropriate decorative ornaments for most varied purposes.

Along high-water mark, as high as the spray bedews the rugged beds of stone, grow the green confervæ; within the tidal zone is the territory of the olive fuci; and the deep is the home of the red weeds, sometimes to be found at dead low water, and even higher on the shore, in like manner as algæ of vivid green are traced to depths of thirty, forty, and even fifty fathoms; for although the rules hold generally good, there are exceptions—as it is said there must be to all rules, to

prevent their becoming axioms. Such, too, of olive, red, and green, is the artificial arrangement by which botanists have classified the algæ, the colours and characters being sufficiently associated and distinctive for even scientific grouping.


Fucus serratus.

Having glanced already at the species of lowest organization, let us take one other instance of the applicability of sea-weeds as objects of design. A dozen collected at random, in one's walk from the edge of the beach to the rim of the tide, would more than suffice for many different applications and manufactures; and the very commonest are equally valuable, and often better than the rarest. Take, then, the first handful you can collect. Among the gatherings of such a parcel are sure to be found some very applicable forms, such as the *Ulva linza*, representated at page 107; the *Fucus nodosus*, page 108; the *Fucus vesiculosus*, page 103; the *Fucus serratus*, here given; *Halidrys siliquosa*, page 110; *Dictyota dichotoma*; *Laminaria Phyllitis*; *L. digitata*; *L. saccharina*, &c.

It is not in the herbarium, not in drawings, not when dried and shrivelled, and black and contorted, that we can see the beauty of sea-weeds; such are no more than the bleared and withered mummies of Egyptian men to the fresh vigour of youth: it is while free and waving in the waters that we must search for the best elucidations of their habits and gracefulness. Years ago Ray wrote in his earnest and noble manner:—"Let us then consider the works of God, and observe the operations of his hands. Let us take notice of, and admire, his infinite wisdom and goodness in the formation of them: no creature in this sublunary world is capable of so doing besides man, and yet we are deficient herein: we content ourselves with the knowledge of the tongues, or a little skill in philology, or history perhaps, and antiquity, and neglect that which to me seems more material—I mean natural history, and the works of creation. I do not discommend or derogate from those other studies; I should betray mine own ignorance and weakness should I do so: I only wish that *this* might be



Halidrys siliquosa.

brought into fashion among us. I wish men would be so equal and civil as not to disparage, deride, and villify those studies which themselves skill not of, or are not conversant in; no knowledge can be more pleasant than this, none that doth so satisfie and feed the soul, in comparison whereto that of words and phrases seem to me insipid and jejune." How he would have rejoiced at the popular movement introduced by Mr. Mitchell at the Zoological Gardens, and since so powerfully backed up by other colossal vivaria of the day; the aquaria at the Crystal Palace, Brighton, Ramsgate, and other places; and what results would he not have predicted when, in walking through the mammon-tainted streets of our great metropolis, he passed dozens of shops for the sale of aquaria, vivaria, glass jars, siphons, prawns, mussels, anemones, efts, and sticklebacks! All these and many more living things cannot be kept and nourished, watched and fed, without the spread of that knowledge which is known, and the acquirement of a vast deal that is new. Naturalists will no longer be able to write books on things they have never seen; and hasty jumpings to conclusions, and closet speculations, will be rarer as the chance of detection becomes the greater, and the spirit in which all true men of science do labour, and ever have done, is the more rightly appreciated. The Merry Monarch's little spaniel has its collar of red morocco, with its silver plate, and the imprisoned songster of a warmer clime is confined in a pretty cage. The love of natural history is not the cherished taste of the poor—it is not bounded by the circumscribed limits of the middle ranks, who find in a glass jar of living objects from the

pond or sea a refreshing pastime from the heavy cares of daily bread, and a cooling relief from toil, or the feverish anxieties of money-making; but the love of natural history lives no less in high places and delicate minds, whose susceptibilities have been heightened by every kind of culture, gaze with delight on the glittering armour of the scaly fish, and watch with interest the actions, motions, and habits of the thousand instructive objects to be collected at any time in a single tide. How charming to give a little elegance to the transparent homes to which we consign our new-made pets! We no longer confine ourselves to cheap glass and zinc fountains. White marble and bronze have brought our favourites into the boudoir and the drawing-room. Look at the festoons of fuci on the rugged rocks: have not worse things been chiselled and cast? and at that tall bundle of crisp *Laminaria Phyllitis*, as it stands erect in the transparent water. How charmingly a crystal vase would rest upon its slightly diverging crests, like the abacus on the leaves of a Corinthian pillar! how delicate the slight frillings of the margins of its translucent fronds!

Various other applications are at once suggested by the little group we have figured; such are mouldings, beadings, tracery, and cornices, and for the sculpture of mahogany and other dark woods; and in our progress through the more elaborate forms of sea-weeds we shall find very much to admire as elegant, and as applicable to manufactures and to the ornamentation of various objects—often of opposite purposes.

II.

As one coming in a strange land for the first time, on a junction of many roads, finds himself bewildered, and hesitating in his choice which to take, being ignorant which leads to the fairest places, and not knowing what beauties he may miss by selecting the one or the other, so in displaying the attractions of sea-weeds for artistic purposes—a field where so little has been attempted—it is not easy to decide, where so many courses appear to be open. It is not the difficulty of a beginning, for the start has been made; nor of the end, for a precipitate retreat has happened to more than one illustrious character; and if these pages could prove as entertaining as the immortal Sam's valentine, even "a sudden pull up" might only make the reader "wish there was more." But the difficulty is in adopting that order of narration which shall be most attractive in securing for the neglected sea-weeds their due meed of recognition and reward.

In the former chapter are figured some of those prevalent species which no one could fail to find in a walk along the shore: in this, which is devoted to the olive weeds or true fuci, the illustrations are drawn chiefly from among others of those common forms which are accessible to everybody, about which there are no considerations of rarity, pains, or price, and which indeed are always to be had for the trouble of picking them up.

These *Melanosperms* are characterized by naturalists as plants of an olive green or brown colour, and as being in their fructification either monœcious or diœcious, that is, having the distinctive organs on the same or on different plants. They are propagated by spores, either developed externally, or singly, or in groups in proper conceptacles, each spore being enveloped in a pellucid skin called a perispore, and being in some cases simple, and in others ultimately dividing into two, four, or eight sporules. Antheridia—a term admitted as indicative only, and by courtesy in the case of algæ, the actual propriety of the term being still contested—appear in some; in others are transparent cells filled with orange-coloured vivacious corpuscles, possessed of free motion by means of vibratile cilia. The whole group is marine. If any take objection to the word "plants," the botanist will tell them that algæ have a double respiration, like their higher sisters of the land,—that by day they absorb carbonic-acid gas, and give out the life-supporting oxygen, and that in the silent hours of the night they reverse the process, and emit carbonic-acid gas.

To point out their relations and corcordances with terrestrial vegetation is, however, a very easy task; but not so is it to draw the line between animality and vegetation. Some authors, indeed, and those not despicable ones, have gone so far as to assert that the germs of some sea-weeds, in their first condition, are actually endowed with life. Be this as it may, no line has yet been drawn which separates either distinctly or decisively the animal from the plant; and, as Dr. Lindley truly observes, "whatever errors

of observation may have occurred, those very errors, to say nothing of the true ones, show the extreme difficulty, not to say impossibility, of pointing out the exact frontier of either kingdom." We commence our present division — and shall follow the like course with the others—with its higher forms, and, proceeding in descending order, shall in each conclude with those humble rudimentary forms in which the rigid divisions of classification are obliterated, and the only differences which can be assigned are, at best, but little more than arbitrary.

To me how welcome and how dear are the olive algals of the rocky shores! Born within sound of the surging waves, for ever singing "their unrhymed lyric lays" — from infancy to manhood living on the margin of the briny deep—how fresh and dear to me these much-neglected things! "What pleasant visions haunt me" of childish hopes and fears; and as again I seem to

"Gaze upon the sea,
All the old romantic legends,
All my dreams come back to me."

And in Fancy's realms my drooping thoughts pass on to those homeless wanderers over the face of the earth, for whom never more the scenes of their first homes will wear a charm—who, torn from all familiar ties, and tossed and buffeted on the sea of life, may perish unregarded in some far-distant land. The surging crests of the great ocean's waves oft cast, to moulder on our shores, the weeds and plants of other climes. We have figured

one of these fragments, which, after its long and boisterous wanderings from the Azores to the eastern shores of the new world, across the wide Atlantic to our own boreal coasts of the old, has lost but little of its beauty. In the days of old adventure the matted cords of this charming species stopped the famous Spaniard's ships; and still the long and narrow floating isles of Gulf-weeds—shunned by the sailor—are the resting-places of myriads of crabs, and other hosts of ocean's progenies hide and nestle in its watery bowers.

But charming as the *Sargassum bacciferum* is in its gracefulness, and attractive as it may be in its historic associations, naturalists would not, of course, admit either itself or its congener, the *Sargassum vulgare*, as a truly British kind, but would properly regard them as stray waifs from tropical climes. The generic name is a Latinisation of the term *sargazo*, given to the Gulf-weeds by the companions of Columbus, and will for ever preserve the memory of its first discoverer; while the ancient specific additamentum of *natans*, or swimming, was highly characteristic of the habits of the species.

Next in the ranks, and foremost of the really British weeds, stands the common, but elegant, *Halidrys siliquosa*, already figured at page 110, distinguished from all other fuci by the compound structure of its air-vessels—a character peculiar to it, and to the beautiful *Fucus osmundaceus*, of the western shores of North America. In the last the structure is slightly different, the vesicles being constricted at the joints like strings of beads.

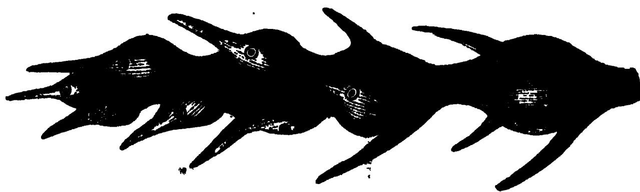
The air-vessels of the *Halidrys siliquosa* are those pea-pod-like



Sargassum bacciferum, or Gulf-weed.

expansions of the frond, divided into chambers, which seem almost to take the place of leaves in the engraving (p. 110).

Intermediate between Halidrys and the true fuci is placed the genus *Cystoceira*. One of the most elegant of this charming genus is the heath-like species, *Cystoceira ericoides*. On the shores of the south of England especially, and over a very considerable geographical range, extending even to the north of Africa, it may be gathered at almost any period of the summer or autumn. Under the water it glows with prismatic colours, and as each twig waves to and fro, the hues vary as the light glances on its fronds; and while some "seem covered with sky-blue flowers, others remain dark." In the air it presents only a glossy yellow, and in



Magnified View of Receptacle and Vesicle at Apex of Branch of Cystoceira ericoides.

the herbarium all its enchanting beauties of colour are gone, and unless very great pains and skill have been exercised in the manipulation, it will have shrunk in drying, and turned black.

In passing, it will be as well to gather specimens of the rather stiff and cylindrical *Pycnophycus tuberculatus*, standing alone as it does *sui generis*.

Of the true fuci, at page 108 is already figured the knotted one, of which Scotch boys make whistles (*Fucus nodosus*), and that with the saw-like edges (*Fucus serratus*), p. 109; but the ordinary bladder-bearing sort, the *Fucus vesiculosus*, and the more translucent and

bladderless or smooth kind, the *Fucus ceranoides*, and indeed the whole genus, though common in the extreme, have high claims to the attention of designers, not alone in the elegance of their outlines and the disposition of their fronds, but as being the very types and models of sea-weeds.

The *Fucus vesiculosus* was at one time, particularly in the Orkney Isles, regularly cropped for the manufacture of kelp, and it is also known to contain a valuable portion of the sweet principle called mannite. In the cold and inhospitable regions of the polar lands, where the thick snow has buried the scanty herbage of the fields, the rocks furnish in their meadows of fuci abundant fodder for the hungry kine, which regularly, at the retreat of the tide, come down to graze; and if these pages were not devoted to other arts than the culinary, one might not unentertainingly give a disquisition on edible sea-weeds, and on the various means by which they are made subservient to the luxuries or necessities of man.

The Icelanders, Greenlanders, the Chinese, and the East Indians have already made some progress in this department; and nearer home, the *Chondrus crispus*, "carrageen," or Irish moss, figured at page 120, has long ago been placed on the table, in soup, jellies, and blanc-manges.

Or, if the natural history of the class were the object, one might with equal pleasure dwell on the marvellous exhibition of the strange animal-like motions of the troops of zoospores which issue from the thick yellow slime exuded from the ripe receptacles of the *Fucus serratus*—motions apparently so voluntary

that it is difficult to consider them as concordant with mere vegetation.

I have already hinted at the capabilities of these weeds as suggestive models for the carver in wood. Now few modern



Chondrus crispus.

structures are fitted up with more elegance than our first-class ships, and in them no one will contend there is not a great and appropriate field for the display of the ornamental or decorative capabilities of sea-weeds. Here they are at once appropriate

and reminiscent of those shores the voyagers have left behind—speaking to them, whilst gliding over the sea, of those lands whence they had departed, and of those other lands which they are seeking. Around and beneath figure-heads, as scrolls upon the bows or stern, bordering the panels of the cabin, and modelled to suit the various machinery on deck, the designer might create a marine ornamentation as characteristic and as pleasing, and as elaborate, if he chose, as Corinthian skill developed from the tile-covered plant for the architecture of the land.

In bronze or in iron, indeed in all dark metal-work, the fuci could not fail to be elegant objects, and rich in their grouping and in the effects produced. In many of those objects, too, which the gilder prepares, the cockle-shells, or cockle-like scrolls and cups so prominently displayed might be as elegantly and more appropriately supported by well-devised groups of algæ than by lilies, fleurs-de-lys, or traceries of meaningless design.

One very pretty diminutive species of *Fucus* (*F. canaliculatus*) grows on the very edge of the tide, and often where the waves wet the rocks only with their spray. The chief crop grows certainly above the level of half-tide, and these plants show a preference for droughty situations; not unfrequently in the hot days of the summer we find them quite crisp and dry, but on the return of the tide they again absorb the aqueous fluid, and recover life and flexibility. So sea-weeds which have long been shrivelled up in the house will recover in appearance all their freshness and verdancy on being merely immersed in a glass of salt or spring water; and the virtues of the former are now brought from the sea

into our homes in the form of Tidman's Crystals. I make this allusion because it is important that the artist, living perhaps in some inland town or city, should know that the natural models he may bring from the seaside on his holiday trip may be in reality, though not apparently, usefully retained for future studies. Many of the more leathery kinds will submit to several resuscitations of this nature, although, as might be expected, a deterioration and loss of colour, more or less, take place in each successive instance. The ordinary method of preserving sea-weeds for natural-history purposes is, as is familiarly known, to press them between folds of linen and blotting-paper on to stout drawing-paper, to which by their glutinous substance they firmly adhere, forming, under the skilfulness of the manipulator, the most exquisite natural pictures. In all these, however, the very act of compression, and the spreading out of the object on a flat surface, gives an unnatural aspect, very different from their free condition. It may be well, therefore, to state that in some few experiments I have made I have found that pure glycerine will preserve even the more pulpy and plump sorts—if I may use that expressive adjective—without even the slightest change for at least considerable periods. Some of my specimens have been kept in glycerine for more than eight months, and are as fresh in substance and in colour as when they were first collected. Choice samples seem thus capable of being indefinitely preserved in proper glass or earthen vessels for use at any time by the designer.

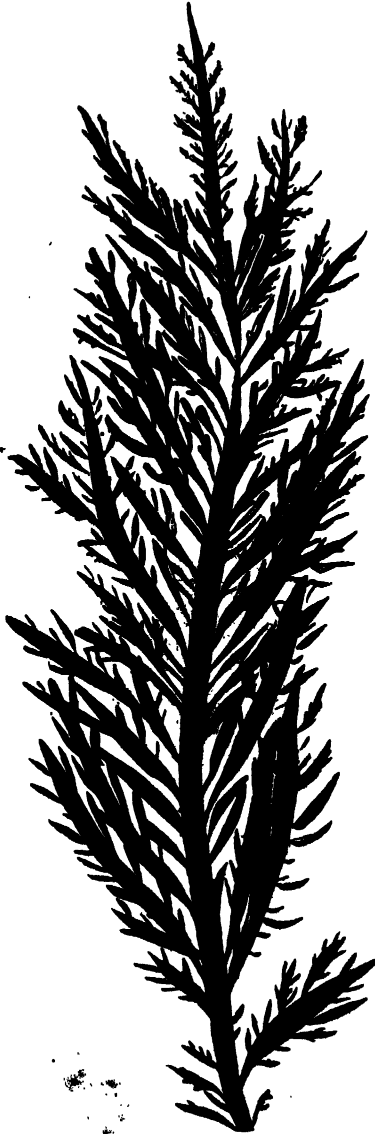
In a visit to the art-museums at South Kensington I observed two instances of the introduction of sea-weed: one in Mr. H.

Weekes's noble statue of a "Young Naturalist," where, though sparingly made use of, they can but be regarded as successful innovations; the other in the collection of imitation Majolica ware, where a large vase has in relief some fronds of the *Fucus serratus*, which, from their unnaturally bright green and the want of strict attention to the natural model, are not so attractive as could have been desired. That sea-weeds, both painted or impressed upon china and earthenware, are capable of producing fine results, can scarcely be doubted; and although it cannot be written of me, as it was of an eminent statesman,—

"China's the passion of his soul—
A cup, a plate, a dish, a bowl,
Can kindle wishes in his breast,
Inflame with joy, or break his rest,"—

I shall not willingly give up the potter's art as intractable to my purpose.

The genus *Desmarestia*, which follows the fuci in natural order, offers some neat patterns for the painting of pottery and china ware, especially in the long oval fronds of the *Desmarestia ligulata*, a microscopic section of which is given at page 103. Its branching fronds, so leaf-like in their development, and yet so unleaf-like in reality, tempted me to figure a single branch of one of these plants, as an example of its peculiar characters, which, in their pale olive-green and purple hues, could scarcely fail of showing to advantage on the white translucent ground of aluminous materials. We have plates of a particularly small size dedicated to the curdled produce of the dairy—in plain English, we have


Portion of Desmarestia ligulata.

cheese-plates, we have soup-tureens and vegetable-dishes, meat-plates and dessert-plates; and why might we not have articles appropriated to the service of fish, and decorated with sea-weeds? I have frequently seen, in drying these objects, their forms impressed through the thick blotting-paper, and forming very beautiful tracery in low relief on the opposite side. Such impressions have always suggested the idea of a similarly simple, chaste, and elegant ornamentation of the plainer and commoner wares. The impressions left by the *Chondrus crispus*, *Dictyota dichotoma*, and other flat and interlacing forms, are most admirable for such a process. Simple accidents may often lead to unexpected results; and Grecian legends even attribute the discovery of modelling in relief to the tracing upon the wall, by a

potter's daughter, of the shadow of her departing lover's face, which her father modelled afterwards in clay.

Passing by the genera *Arthrocladia*, *Sporochnus*, and *Carpomitra*, which all, in a greater or lesser degree, offer pleasing running patterns for the painting of porcelain or earthenware, and of flat surfaces in general, we come to the noble family of the *Laminariæ*, so well and ordinarily known under the names of sea-girdles and tangle. The size and expanse of the fronds



Root of Laminaria.

of the various species of *Laminariæ* exposed, in the bleak and unprotected situations in which they grow, to the full fury of the waves, are provided for in their leathery toughness, the rope-like stem, and the numerous attaching discs of their branching roots. The root of the sea-weed differs very materially from the root of a plant: through it no nutritious sustenance is conveyed to the algal; it draws nothing from the soil; it is furnished with no organs; it is merely an adhesive holdfast, similar

in principle to the sucker by which street-boys lift bricks and stones; it sends down no ramifying fibres into crevices of the rocks, but merely adheres to the surface. How far their peculiar characters could be elegantly made use of for the handles of vases, covers, lids, and other objects and parts of articles which require to be lifted or raised, must remain to be developed by the practical designer and manufacturer.

The mussels and shell-fish which attach themselves to the firm rootlets of the tangle, or which spin together or nestle in the meandering fronds of the smaller kinds, often produce groupings worthy of much admiration, and which would form material aids in the elaboration of practical patterns.

As there is much difficulty in expressing in a greatly reduced drawing a long and narrow form like that of the common tangle, I have contented myself with giving a figure of one of the roots, to show how applicable they are for art-purposes.

The North American and Kamtschatkan species—the *Laminaria longicrucis*—has a frond as large as a table-cloth, and a stem of proportionate length. The English species attain very frequently to six or eight feet, although in their native habitats they may be gathered of every size, and in every stage of growth; and to reduce such giants to the scale of a few inches would give no idea of their grandeur or beauty.

Of those immensely long and slender sea-weeds, placed by algologists in a distinct genus, with the expressive name of *Chorda*, little use, I think, can be made in the way of design. The mere collector has to wind them assiduously into a coil in his

herbarium; and in their native element the only purpose they seem to serve is to stop the passage of boats, or to drown unfortunate swimmers by entanglement about their legs; for, although often thirty or forty feet in length even on British shores, and not thicker at their base than a whipcord, they are extremely tough and tenacious.

The case is very different with the beautiful *Dictyotaceæ*, in which family is included the splendid *Padina pavonia*, with hues nearly as bright and as rich as the "eye-spots" on the tail of the glorious bird from which its specific name is taken. Such a marine beauty was not likely to escape the attention of even early naturalists, and we accordingly find it mentioned in the writings of Bauchin and others. Ellis, although he has no business with it, cannot resist the temptation to figure it in his famous book on Corallines.

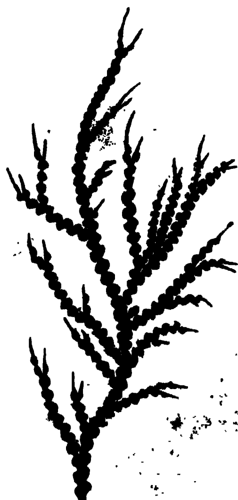


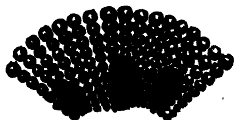
Dictyota atomaria.

In the genus *Cutleria* we are presented with some attractive novelties, but the typical genus *Dictyola* merits special attention.

If the number and variety of names by which an algal was known had any connection with its charms or its rarity, one

member at least of the characteristic group, the *Dictyota atomaria* ought to be—as it really is—both rare and beautiful. The ancient *nomen triviale* of *Phasiana* expresses well, in its allusion to the plumage of that handsome bird, the barred and zigzag markings caused by the scattering in the substance of the frond—almost as one would cast grains of sand or seeds by the hand—of the dark-coloured spores or germs. The whole plant, too, exhibits those most delicate gradations of the primitive hue which are not the least remarkable characteristic of all sea-weeds. And in what are our designers more deficient—especially those employed in the decoration of our houses—than in simple and delicate contrasts, or more especially in those almost insensible gradations of colours which are so admirable in their effect, and which are so invariably presented to us alike in the sombre olive and in the bright greens and reds of the sea-weeds? We have no power to express these natural gradations in our woodcuts, but there is certainly much in this way worthy of patient study. In this large and extensive family there are yet more instances of how various sections and magnificent portions may possess artistic value. The section of a sorus of *Stilophora rhizodes* seems, for example, so like the representation of a fragment of jewellery, that it cannot fail to excite wonder

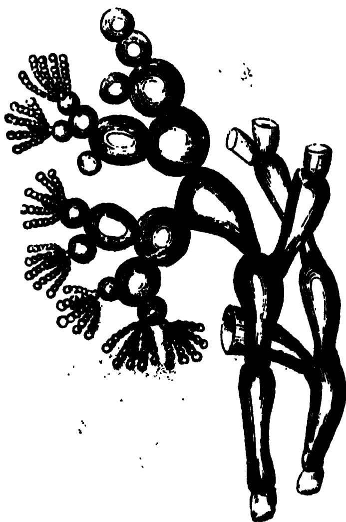

Stilophora rhizodes.


Section of a Sorus of Stilophora rhizodes.

that a source so prolific should have been neglected by our workers in gold and silver, and our setters of pearls and precious stones.

The *Mesogloia vermicularis*, one of the gelatinous *Chordariaceæ*, is an ugly weed, but the filaments of the fronds are worthy, notwithstanding, of being placed under the power of the microscope and viewed by an artist.

So, too, with the hollow cottony *Leathesia*, looking like a macerated walnut tufting the surface of the rock: only peer into it with microscopic vision, and a forest of crystal fibres, composed of divided cells, the lower ones long and slender, the upper shorter, and supporting little hyaline half-moons on their cusps, springs into existence. The tiny tufts of the *Elachista* and *Myrionema* abound in bead-chain fibres, while the genera *Cladostephus* and *Sphacelaria* offer more visible patterns of a kind at once unleaf-like and novel. The *Sphacelaria plumosa*, so wiry and feathery, resembles those curious members of the animal kingdom, the *Sertulariæ*, as which it is almost as rigid and as elegant; while the small tufts of the rare *Sphacelaria ramosa* are again charming microscopic objects.

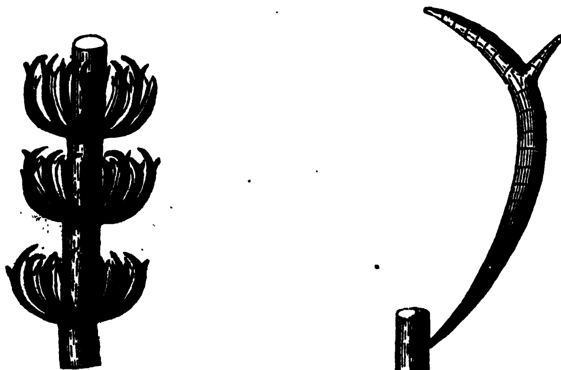


Portion of Filaments, Axial and Peripherical, of Mesogloia vermicularis.

The family *Ectocarpaceæ* contains a fund of marvellous ideas. One more genus of British olive weeds alone remains to be

mentioned, consisting of two little parasitic species not uncommon on the fronds of *Chorda lomentaria*; but though curious and singular in construction, they offer nothing so tempting as many of those we have been compelled to pass over in silence.

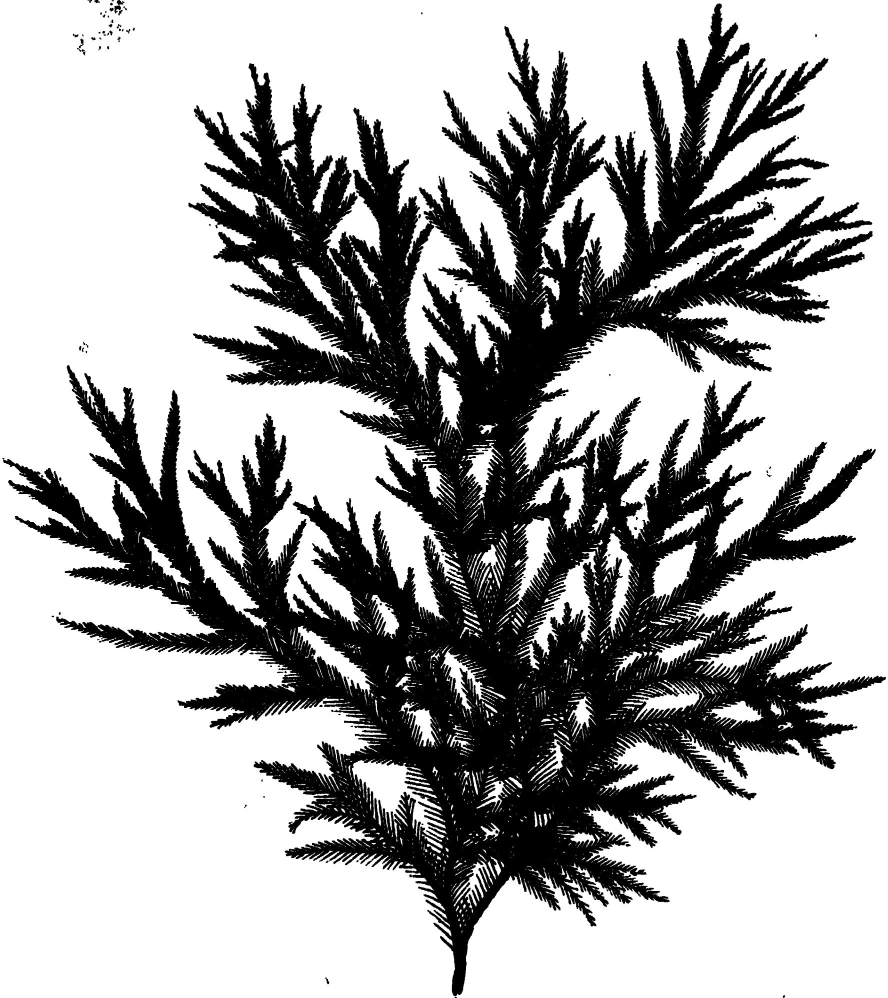
For the purpose of study, the *Melanosperms* offer a never-failing supply, always accessible at low water; but should opportunity arise of acquiring a knowledge of the *Rhodosperms*, with their fairy forms and brilliant hues, it should not be neglected,



Cladostephus verticillatus.
Portion of a branch. *One of the ramuli.*

for these deep-water algals seldom reach us but in broken plants washed ashore; and dried specimens, flattened and faded, cease to be models for study. As to the *Chlorosperms*, the *Ulvæ* are full of grace and beauty, and in the south of England they are served at table as a relish to roast meat, under the title of laver, and which is now sold in many London shops. The *Ulva linza*, figured at p. 107, is a good type of the graceful outline of this elegant family of sea-weeds.

Oft beneath the warm and brilliant rays of summer's sun, in



Portion of Sphacelaria plumosa.

shallow skiff, I have glided on the calm and polished surface of

the sea—the mirror of the glowing sky and heavens beyond—over the dark forests of tangle waving in the tide, and plucked the pellucid limpets browsing on their stems; and, peering down into the rugged dells below, have seen the star-fish crawl with sucker-arms along the rocks, where whelks drill holes in shells of stone-clad molluscs, to feed upon their soft and luscious flesh; where sea-anémones, with outspread tentacles, make gardens of living flowers; and awkward crabs peep out from darksome nooks at glittering fish, then scramble sidelong back again into their holes.

In winter, by the raging waves—when skaters swift o'er slippery ice with rapid pace were gliding; when ears were tingling with the biting cold, and tender people roasting over blazing fires—I have paced along the congealed sands to see the shell-fish frozen hard and fast, glued to the rocks; and sea-weeds, crisp and rigid, recover life and elasticity in the flowing tide.

In time of spring I have hunted over the slippery meadows of our shores for the instinct-led travellers from the deep, coming to the shallow tidal zone to propagate their tribes. And in the golden season I have watched the sportive play, in rocky pools o'ershadowed by these graceful weeds, of iridescent annelide and cilia-paddled beroe—have tracked the skipping shrimps along the silvery sands, or have patiently followed the *Patella vulgaris* in its solemn march to graze upon the verdant ulvæ, and again returning at the change of tide to adjust its conical house with stately nicety on its proper site.

III.

ON THE CRYSTALS OF SNOW AS APPLIED TO THE PURPOSES OF DESIGN.

By JAMES GLAISHER, F.R.S.

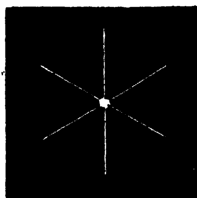
ON THE CRYSTALS OF SNOW AS APPLIED TO THE PURPOSES OF DESIGN.

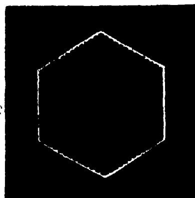
I.

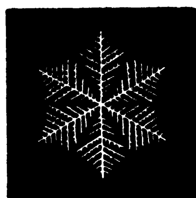
SNOW, in the ordinary acceptation of the word, is suggestive of a soft flocculent matter of considerable opacity, falling in flakes, and, as compared with water, of little density—a foot of fresh-fallen snow producing but from a tenth to a twelfth part of water. Snow, however, does not always fall in flakes; under certain conditions of atmosphere and temperature it occasionally falls in groups of slender needle-like particles or spiculæ, which under the microscope exhibit no structural detail worthy of remark, but are irregular and jagged in outline. This is one of the most imperfect forms of snow crystallization, and occurs generally at a temperature but little above freezing, and at the commencement of a severe and continued frost, or immediately preceding a general thaw.

At other times a light feathery snow may be seen to fall, composed almost entirely of stars of six spiculæ or radii, united in the centre by a white molecule. These are seldom less than from four to five tenths of an inch in diameter, and are generally collected in tufts of half-a-dozen or more together, which in calm

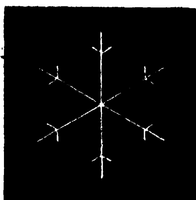
weather waft uninjured to the ground. Sometimes these are mixed with other stars of more intricate figure, to be spoken of presently. Fig. 1 illustrates this variety, and is enlarged to double the proportions of the original.

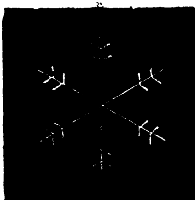

Fig. 1.

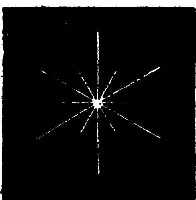

Fig. 2.


Fig. 3.

Sometimes a heavy fall of ordinary snow may be accompanied by a number of minute specks, glistening among the flakes like fragments of talc or mica, as seen sparkling in a mass of granite. On careful investigation these prove to be thin laminated


Fig. 4.


Fig. 5.


Fig. 6.

hexagons of the most perfect delicacy and symmetry of form, as shown in Fig. 2.

The hexagon and star being the base of all the crystals of snow yet observed, we will proceed to show how the more elaborate figures are compounded of these two primary elements.

To explain various peculiarities of structure which occur in several of the larger drawings, we will refer to the process of crystallization as carried on at low temperatures on the surface of still or gently-moving water.

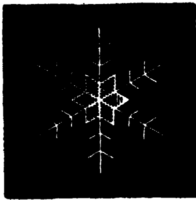


Fig. 7.



Fig. 8.

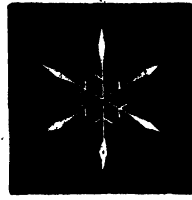


Fig. 9.

Water freezes at an angle of 60°. On its first congelation, under favourable circumstances for observation, we perceive in parts, generally about the centre and around the margin, a corrugation of its surface. This corrugation presently discovers a series of distinct figures, needle-like in form, and analogous to the spiculæ of snow.



Fig. 10.



Fig. 11.

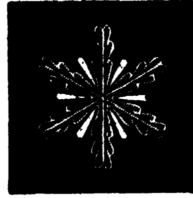


Fig. 12.

As the process continues, to each of these needles, while yet forming, a serrated incrustation of leafy or arborescent character is attaching itself, so that in time the greater number of them become each the centre of a crystalline pinna, not unlike a frond

of the lady fern. Fig. 25 (page 140) is a sketch of one, the size of the original, as observed by T. G. Rylands, Esq., of Warrington, and sent to us during the severe winter of 1855. The overlapping observable on one side of the pinna is a peculiarity generally to be found in three out of the six leaves forming the entire crystal.

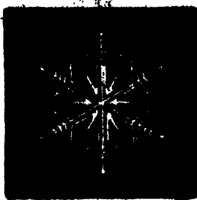

Fig. 13.


Fig. 14.

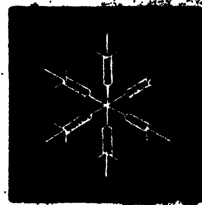
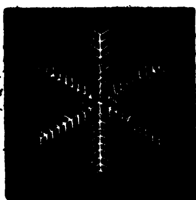

Fig. 15.

Fig. 26 (page 141) represents the crystal when complete; the drawing was made by ourselves, and gives with great exactitude the figure of the needles, which, it will be observed, diverge from the main stem uniformly at an angle of 60°. The position


Fig. 16.

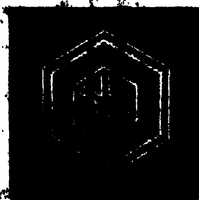

Fig. 17.


Fig. 18.

maintained by them around the centre of the crystal is beautifully adaptive, and well worth examination.

It is not always that the primitive spiculæ are divergent in groups of six. At times they arrange themselves irregularly in clusters, and crystallization proceeds with results of a character

somewhat different, but scarcely less beautiful, of which Fig. 27 (page 142) may be considered a type. This is analogous to the fanciful forms of frost seen on the interior of a pane of glass, and is frequently to be found where the water is very shallow, and where its mixture with some gritty substance, or blade of grass, or other ob-

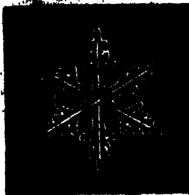


Fig. 19.



Fig. 20.

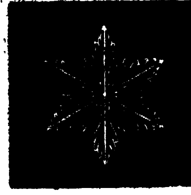


Fig. 21.

struction, has in all probability interfered with a more geometric arrangement. By degrees the whole surface of the water becomes interlaced with needles and pinnæ, whether singly or in groups, and thin laminated surfaces of ice which cover all interstices.



Fig. 22.

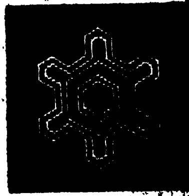


Fig. 23.

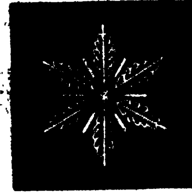


Fig. 24.

Then, according to external influences, the ice either thickens, obliterating all this beautiful tracery, or it melts away before the rising temperature of the day. It often happens, however, that these processes occur after dark, or that the water freezes so rapidly as to disappoint the wishes of the observer. At moderate

temperatures these changes are best observed; but, in our opinion, they are somewhat dependent on other atmospheric conditions. The formation of the needles is common to the

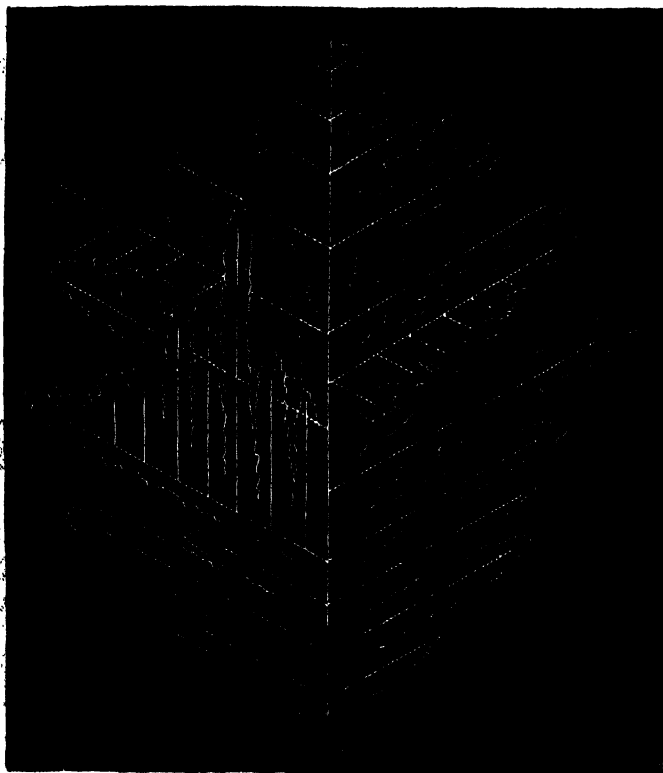


Fig. 25.

freezing of water under all circumstances, and they vary from a few inches to a few feet in length.

To return to the crystals of snow. Fig. 3 (page 136) is another

elementary figure, common to temperatures about the freezing-point; it is not often less than half an inch in diameter, and is a miniature copy of the water crystal.

Another simple order of figures, and containing within them-

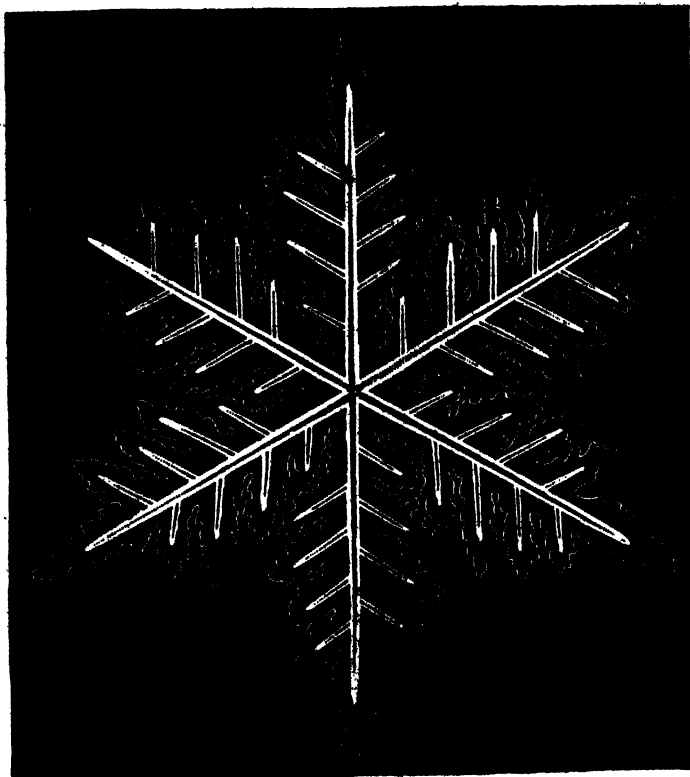
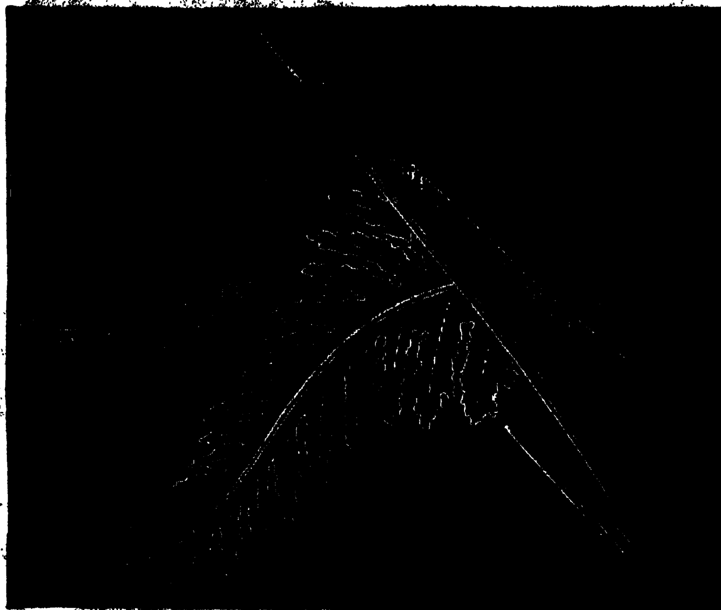


Fig. 26.

selves the germ of the most symmetrical combinations, is that of which Figs. 4 and 5 (page 136) are types; they exhibit secondary spiculæ diverging from the principal radii at an angle of 60°.

Around the simple it frequently happens that a secondary and smaller star is arranged, as in Fig. 6 (page 136), the radii of which are intermediate between those of the former. An angle of 30° is, however, of unfrequent occurrence, and it seems probable that in



this and similar cases it is the union of two crystals of distinct hexagonal formation.

Sometimes it happens that the secondary spiculæ, which we see in Figs. 4 and 5, are continued down the main radii until they form a contact with each other, as in Fig. 7 (page 137). The star thus enclosed about the centre generally becomes laminated and of

great transparency. In other varieties, as in Fig. 8 (page 137), it is intersected by the rays of the secondary or intermediate crystal.

Having traced the elementary principles of these figures to the first formation of a simple nucleus, we will proceed to the consideration of the more compound varieties, in which the nucleus is a conspicuous element of construction.

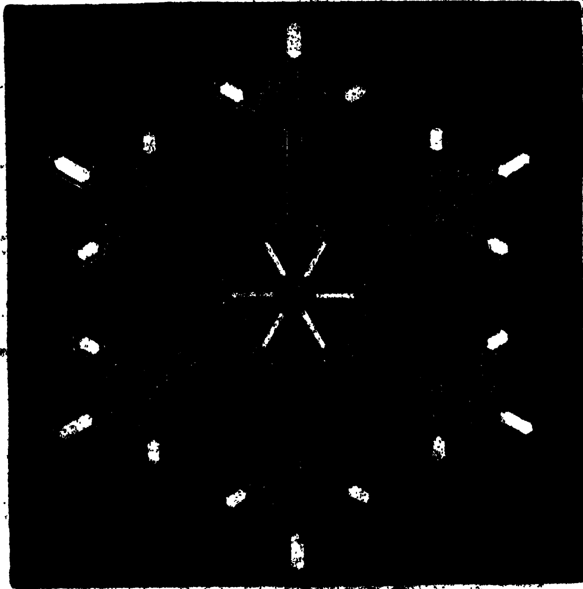


Fig. 28.

The figures we have been considering, although possessed of unity of design in a high degree, are found to exhibit no great perfection of structural detail when examined beneath a lens; those that we are about to inquire into belong to a more perfect order, much more minute and very compound.

Fig. 28 is a figure of this class, much enlarged and drawn as seen beneath a microscope. It was highly crystallized, and the angles and planes of which it is composed were sharply and well defined. The prisms at the end of the radii were cut into facets, and glistened with brilliancy, as did the six prisms around the centre. The radial arms were sharply cut, six-sided shafts, very

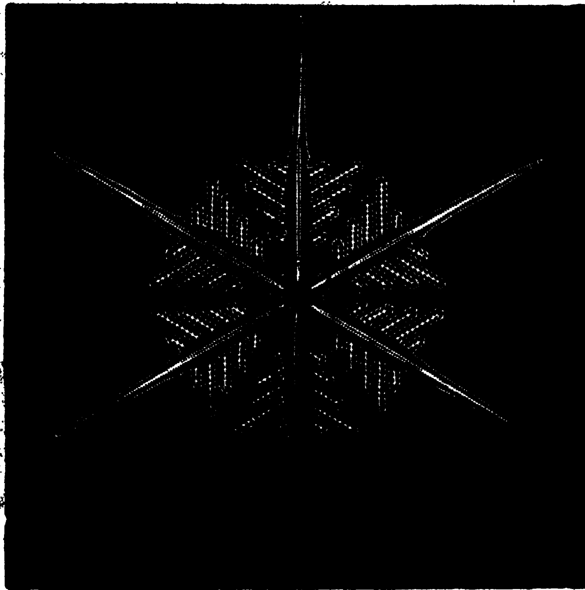


Fig. 29.

different from the snowy rounded spiculæ of the elementary figures. It was easily discernible to the naked eye, and principally those parts which are white in the engraving, and which communicate to the copy very much the effect of the original when under the full influence of direct light. The centre is laminated, hexagonal in

form, and within it we perceive the secondary star of prisms; also that each addition to the radii diverges at an angle of 60°.

Fig. 29 is another, highly crystallized, and composed of parallel prisms, divergent from the radial arms at an angle of 60°, and without nucleus. The irregular blade-like terminations arise from an ill-advised eagerness in the observation of their originally very

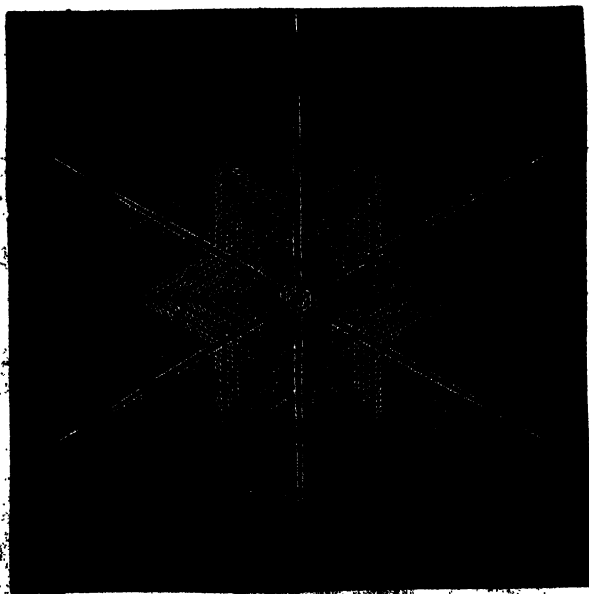


Fig. 30.

complicated structure, by which they were in a moment dissolved, without injury, however, to the symmetry of the figure.

Fig. 30 is a beautiful compound of the higher order of crystallized bodies with the more elementary, the nucleus belonging to the former, and the radii at their extremities to the

latter. This at first sight appears an anomaly; but we explain it on the supposition that the entire structure of the original crystal has been of a high order, the shafts six-sided, as they remain still at their base, and the leafy incrustrations to have been regularly distributed prisms, as in the preceding figure; that the crystal, in its descent, has passed through various temperatures of



FIG. 31.

intense cold, probably exchanged for a warmer at one instant of time, in which it has partially thawed, and again passing into a cold stratum in approaching the ground, has been once more congealed, giving rise to the white opacity and irregular form of its terminations. And this explanation is the more reasonable, as

will be gathered from a description of the dissolving or thawing of these bodies.

Fig. 31 is a crystal seen just previous to its returning to the primitive drop of water. Originally composed of the ordinary radial arms, each supporting prisms of the form seen in Fig. 29, and with a simple hexagonal nucleus, under the influence of

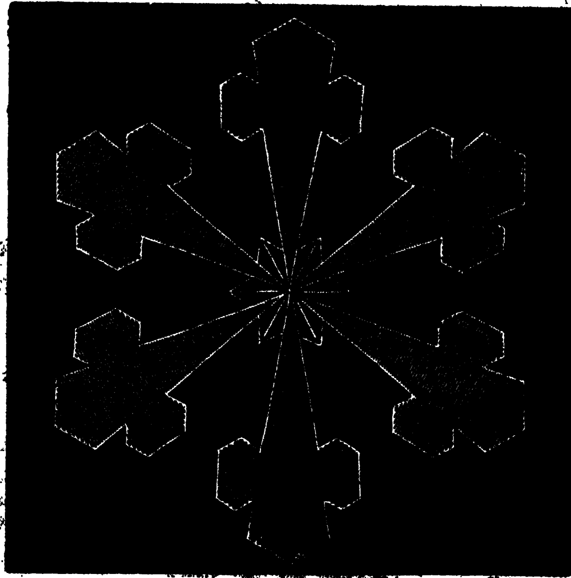


Fig. 32.

a very slightly increased temperature the rigidity of each line has become relaxed, whilst the crystalline matter, all but fluid and no longer heaped up into prisms, is distributed over a wider area, according to the laws of attraction and corresponding area of surface.

A very different order of figures are those of which Figs. 32, 33, 34, and 35 are types. The originals were exceedingly small—so minute, indeed, that the specks containing all these beauties of detail were almost inappreciable to the naked eye. It will readily be perceived that they differ greatly from the order arising out of the primitive star or its secondary radii. The

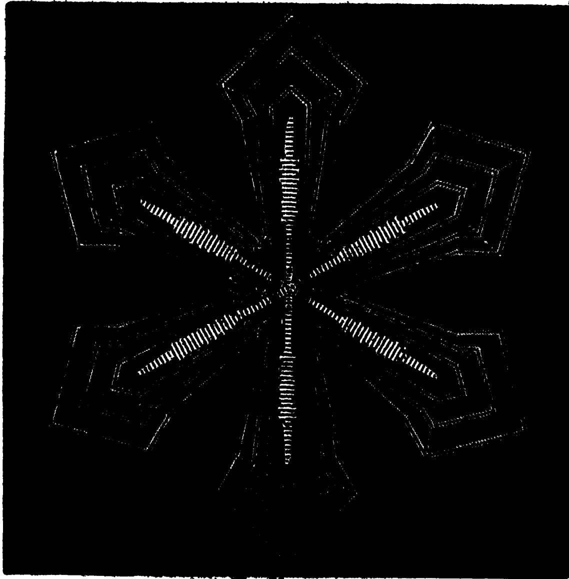


Fig. 33.

base of these must be referred to the hexagon, as shown at Fig. 2. The most highly elaborate of our illustrations, shown at Fig. 33, exhibited a succession of planes raised one above another, the centre of each radial arm intersected by a slender crystalline shaft laden with delicate prisms. Fig. 35 preserves more the form of

the ordinary hexagon, and was cut very regularly into facets. Of Figs. 34 and 35 we were unable to observe the exact disposition of the raised surfaces, and have delineated the outline only:

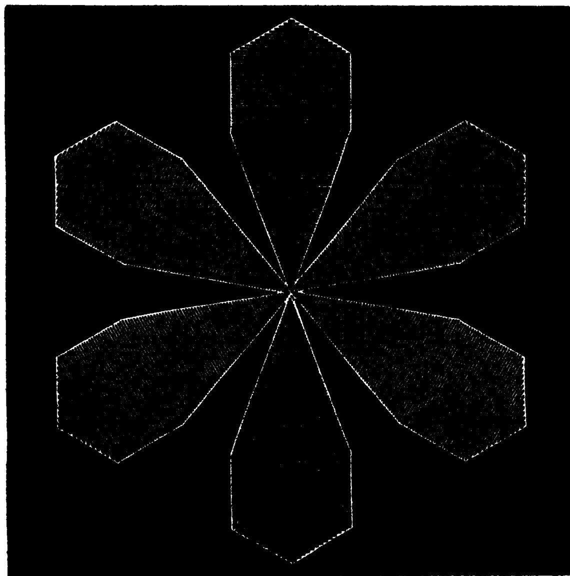


Fig. 34.

these figures fell, with several others far more complicated, during the continuance of a very unusual degree of cold for these latitudes.

II.

We have thus far endeavoured to show the true bases of construction, and how that crystallization proceeds onwards from the simple forms to the more complex, and have selected from numerous varieties a few of the best types illustrative of this progress. Our limits will scarcely permit us further to individualise these beautiful creations; yet, not to mislead, it is necessary to refer to an intermediate order, in which the hexagon star is laden with divergent spiculæ between groups of prisms. Fig. 36, selected from this very numerous class of figures, was one of several observed during the cold weather, following upon the general thaw, which terminated the long-continued and severe frost of 1855. The spiculæ were icicle-like, of the utmost delicacy, opaque, and well defined; the prisms, on the contrary, were watery, almost rounded, and, as it seemed, on the verge of dissolution. The entire figure had the appearance of two distinct orders of formation—the prisms which belong to a very low temperature, and the spiculæ which are commonly formed at and about the freezing-point. Fig. 37 is another of the same class, and in a very intermediate state; the additions to the main radii are neither prisms nor spiculæ, yet partaking of the character of both: its peculiarity consists in the tertiary incrustations being placed downwards towards the centre. This form has been observed only during very severe cold.

Fig. 38 is somewhat analogous to the crystals of water; its

centre is hexagonal, but the prisms are irregular crystalline incrustations of the utmost delicacy and transparency; it was of large size, fully half an inch in diameter, and glistening like a fragment of talc among the snow-flakes, was discernible at a considerable distance.

Fig. 39 (page 156) is a specimen of a double crystal; that is,

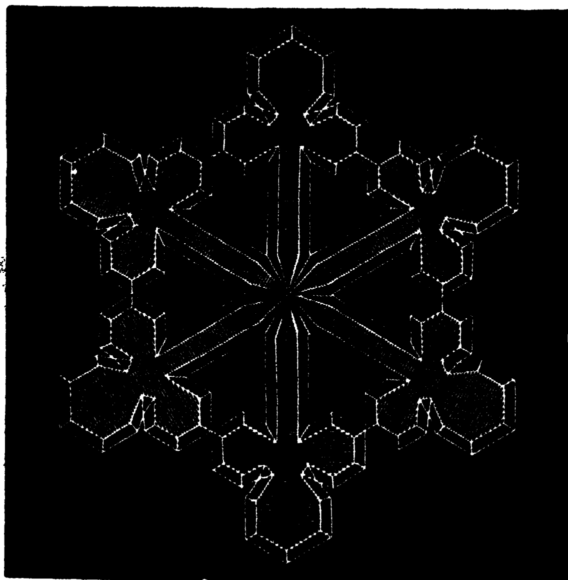


Fig. 35.

two similar crystals united by an axis at right angles to the plane of each. It is highly complex, and the effect of each is more than doubled by the arrangement. Crystals so united are not unfrequent in severe weather.

During one winter our observations numbered nearly two hundred varieties.

The series of small drawings given on pages 137, 138, and 139, were made with a lens of moderate power, but they are not equal in value or structural detail to those drawn beneath the microscope. They are among the most elementary figures observed; and, as illustrative of the first principles of formation, are chiefly worthy of consideration. Of more elaborate

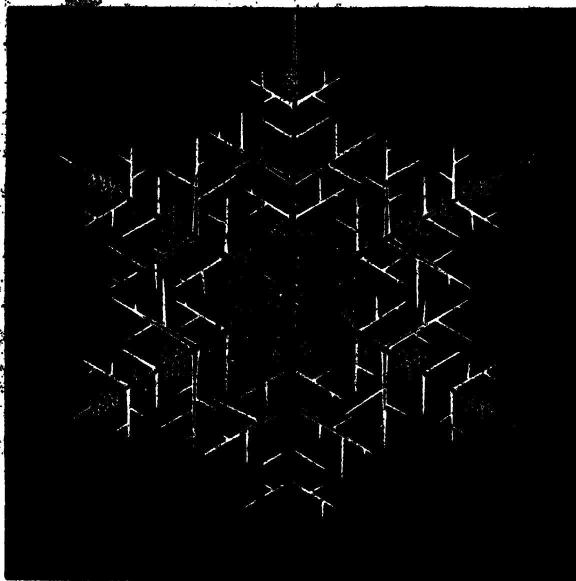


Fig. 36.

figures drawn beneath the microscope, besides those more immediately referred to in the text, examples are given in Figs. 40, 41, and 42.

The idea of observing snow crystals is by no means original. We know for certain that Aristotle observed them; also Descartes,

Greu, Kepler, and Drs. Nettes and Scoresby of modern times. Sir Edward Belcher also devoted a considerable degree of attention to the study of the crystals of snow in the Arctic regions. There the radial arms were seldom less than an inch in length,

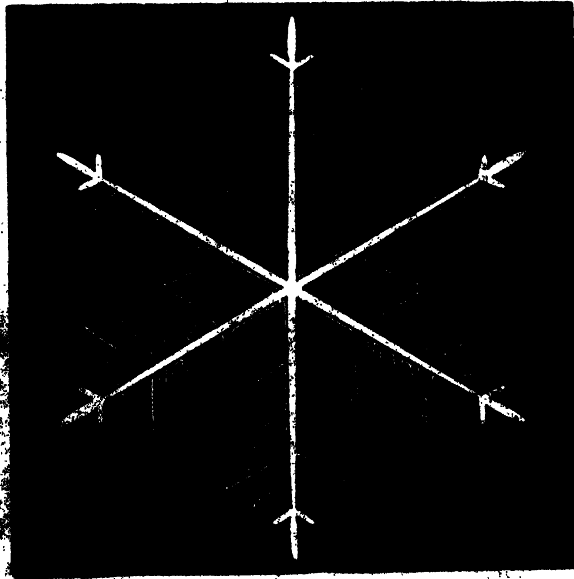


Fig. 37.

and might be seen, according to Sir Edward Belcher, drifted in heaps into the crannies and recesses of the ice. They were seldom to be obtained in a perfect condition, generally separating, by reason of their weight and size, on descending to the ground.

III.

HAVING brought to a close all that is here necessary to say respecting the formation of these bodies, and the position they occupy in regard to scientific inquiry, we may now turn to a consideration of their capabilities to suggest new forms in decorative design, as applied to the industrial arts. Being ourselves desirous to promote the adoption of the appropriate as well as the simple beauty of truth in ornament, we will first inquire how far these figures are in accordance with those general principles of arrangement of form which in all ages and countries have constituted the truly beautiful in art.

These are summed up briefly in the propositions contained in the opening chapter of Mr. Owen Jones's "Grammar of Ornament." We extract the following:—

"Proposition 3.—As Architecture, so all works of the Decorative Arts should possess fitness, proportion, harmony, the result of all which is repose.

"Proposition 5.—Decoration should never be purposely constructed: that which is beautiful is true, that which is true is beautiful.

"Proposition 8.—All ornament should be based upon a geometrical construction.

"Proposition 9.—As in Architecture, so in the Decorative Arts, every assemblage of forms should be arranged on certain definite

proportions; the whole and each particular member should be a multiple of some particular unit.

"Proposition 10.—Harmony of form consists in the proper balancing and contrast of the straight, the inclined, and the curved."

Further on, from the same high authority, we receive as

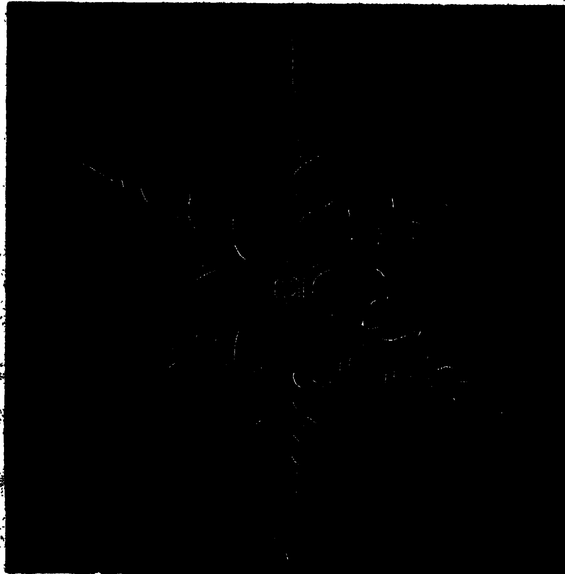


Fig. 38.

an axiom—"That there can be no perfect composition where either of the three primary elements is wanting—the straight, the inclined, and the curved, or where they are not so harmonized that the one preponderates over the other two." In the crystals of snow we perceive these last conditions are implicitly fulfilled,

inasmuch as they include the varieties, straight, angular, and curved, of which the angular has a decided preponderance.

With regard to the proportions of number on which these figures are based, we shall find them almost all deficient in the maintenance of a ratio, water crystallizing at an angle of 60°, a fact exemplified in the radial arms and the secondary and

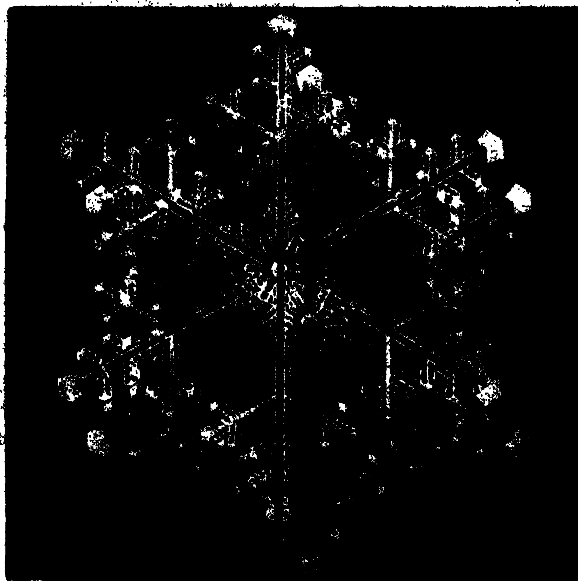


Fig. 39.

tertiary additions, which, always produced at the same angle, are characteristic of the greater number of these crystals. Thus they can be considered suggestive only of more complete designs—the centre, in fact, of a bordering or pattern-work, to be completed round them according to the intended application, and with due

reference to those ratios of number which are found most acceptable in composition.

Founded upon a strictly geometric base, and a uniform repetition of a certain concordant irregularity of parts, bound together in one harmonious unity by the laws of circular composition, which serve to lend beauty to their constructive details, and

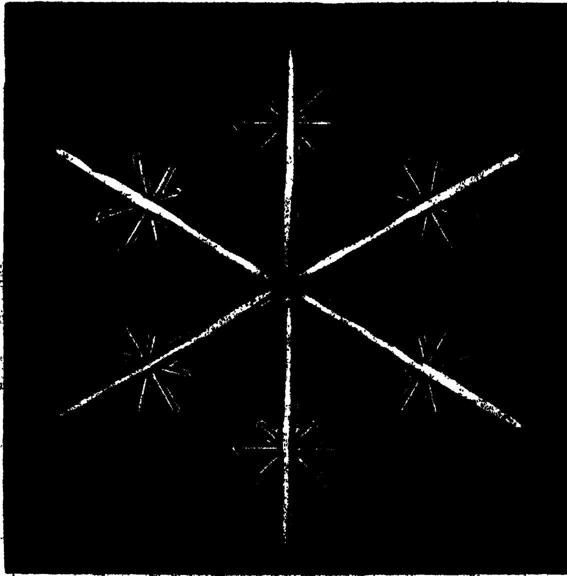


Fig. 40.

constitute the archeus of the figure, we are impressed with a conviction of their truth and conformity to the natural principles of beauty.

The impulse created in their favour is thus subsequently confirmed on rational and acknowledged grounds of admiration.

This is the more satisfactory that, belonging to no school of architecture or design, they may be considered as originating a new order of forms for the further supply or extension of those so long acknowledged and admired. We do not, however, consider that they will equally well assimilate with all or any of the orders of decorative art. It appears to us, according to the means placed

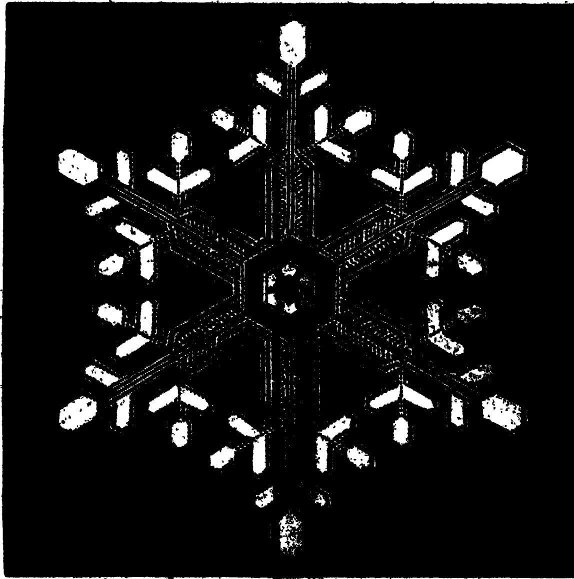


Fig. 41.

at our disposal for arriving at a conclusion, that they are analogous in many respects to the numerous specimens of angular composition which belong to the mediæval period of Byzantine art.

It may not be altogether foreign to the subject briefly to consider the united power of geometric figures, in conjunction

with colour, to produce the striking and beautiful effects which form so important a feature in Byzantine and Moresque mosaic (but particularly the former) specimens of art.

The base of Byzantine mosaic is principally the relation of the hexagon to the triangle, upon which base almost innumerable combinations have been constructed. These Byzantine mosaics



Fig. 42.

are always extremely simple in structure, some being made up entirely of the triangle, others of stars either six or eight rayed, singly or enclosed in a hexagon or octagon placed at intervals, and united by the more simple figure of the triangle, which, arranged in groups, serve as connecting links from one to the

other. The whole composition is rendered either sparkling or monotonous according to the employment of contrasted effects or a limited and uniform range of colour, and is admirably illustrative of how the uniformity of the geometric figure may be broken up and destroyed, its very character changed, indeed, according to the system of colouring adopted—an illustration

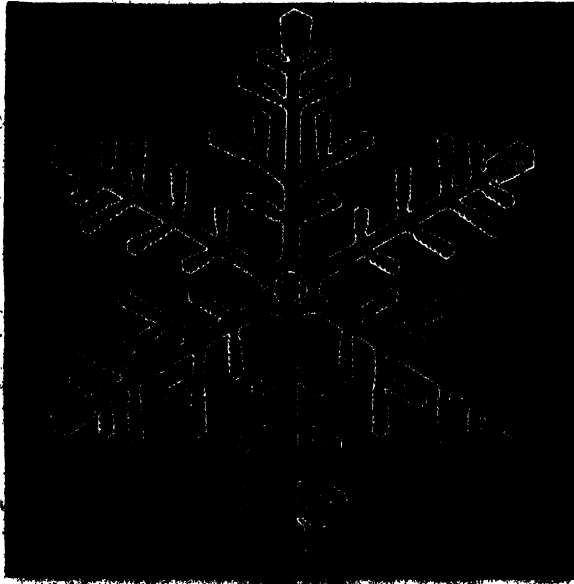


Fig. 43.

still further confirmed by a study of the varied and evolved designs on a part of the encaustic pavement of the Byzantine Court at the Crystal Palace, which, described in shades of neutral tint throughout, upon a ground of the same colour, renders it difficult for the eye to detect any variation of pattern.

The specimens of Moresque mosaic with which we are ac-

quainted differ somewhat in character from that which we have been considering. Based upon the square and its affinities, it is constructed mainly with reference to the ratios of eight, four, and twelve. It is less glittering in colour than the Byzantine, and attracts the eye more to masses than to fragments.

The figures of snow are nearly allied to the principles of these decorative styles of art, based as they are upon a system of angular geometry. We perceive, also, that the primitive base of the crystals is the leading figure of mosaic, founded, as most of it is, upon the hexagon and its combinations, though occasionally admitting, with great effect, the employment of the octagon. Thus they seem naturally suggestive of an extension of the forms common to mosaic, and may be the means of eliciting fresh combinations scarcely less beautiful than those transmitted to us from the past.

The fitness of mosaic for the purposes of decoration is evident, on the ground of its conformity to certain fixed principles of truth which scarcely permit of deviation. One of the oldest of the mechanical arts, originating in experimental combinations with cubes solid and transparent, subsequently improving as the science of geometry became more generally understood, it is now, in the hands of some of our most eminent manufacturers, not the least important among the industrial agents of the present day, as may be seen in the beautiful encaustic and painted tiles for pavements and decorative purposes generally, executed by Messrs. Minton & Co., of Stoke-upon-Trent.

One great fault of the decorative designs of the present day

is the want of "appropriate" ornament to the purposes in view, and the mixture of schools or styles of art, which characterize so many of the patterns commonly produced for domestic and even higher applications—a mixture too often involving the entire destruction of truth, fitness, and proportion, the three essential elements of beauty. In the magnificent work on the "Principles of Ornament," by Mr. Jones, we have an entire history of the past in architectural design, classified into schools, the origin and progress of each, either traced or traceable in connection with the period at which it flourished, and the people who gave it birth. We may therefore anticipate that the pure and beautiful so made known amongst us may exercise an important and beneficial influence on design, from its highest to its lowest applications.

We do not forget, however, that the art of mosaic, taking its rise beneath the sunny skies of Italy and Greece, and glittering even now on the walls and beneath the cloisters of the Byzantine churches of Italy and Sicily, and within the mosques and palaces of the East, accords rather with the genius of the South and the gorgeous taste of the East than with the less florid tone of more northern lands; and a thorough understanding of the conditions under which it so long assimilated with, and continued to constitute a dazzling feature in, the decoration of two, if not three, of the highest styles of architecture—the Moresque, Byzantine, and Arabian—is necessary to enable us to profit to the full by its capabilities as an industrial agent. Nor do we forget that the rise of mosaic (we are speaking of its conventional varieties) was

accompanied by, or was rather the result of, the decline of art, when for a period a mechanical process usurped the place of higher efforts of design and fancy.

For the very reason, however, that the art and its imitations must be to a great extent mechanical, we could wish to see its range of utility still further extended. Not admitting of wide deviations from fixed principles, we would prefer to see it substituted for the large mass of nondescript patterns to which we have already made allusion. And our facilities are great for introducing it into more general use; for in the same way that the painter's art has, with the utmost truthfulness of effect, reproduced for our study and admiration representations of the elaborate inlayings of marble and glass, with which the originals, centuries ago, were constructed, we may carry its imitation successfully into almost every branch of manufacture or decoration; and, whilst preserving the spirit of the combinations, unfettered by the constructive difficulties of the original work, we may engraft new figures, and originate new styles of pattern, perhaps available for a variety of applications.

IV.

An attempt to adapt a revival of Byzantine glass mosaic to various household elegancies has within the last few years been made by Mr. George Stephens, of Pimlico, who, after considerable study of the mosaics of antiquity, has designed a large variety of elaborate and beautifully executed patterns for tables, stands, panellings, candelabra, &c. In the specimens that we have seen his combinations have been based, many of them upon the hexagon and its varieties, and several upon the octagon, which is necessarily more removed from the simplicity of the Byzantine school. In the opinion of Mr. Stephens the figures of snow are highly suggestive of a still further extension of the forms known in mosaic, and he considers that they will materially aid in the construction of new figures. We believe that it is his intention shortly to attempt an adaptation of some of them to the purposes of his art.

We feel that we cannot sufficiently admire the structural detail of the greater number of these productions, and the rich effects of colour united in their composition. But here we may remark, that to render the ancient Byzantine mosaic an appropriate decorative agent, it is necessary that the artist should not copy implicitly from the works of the past, but seek most to maintain between it and surrounding influences the same relation that formerly existed between it and the people under whose hands it attained such distinguished pre-eminence. As we have already

said, the art originated beneath the skies of Italy and Greece, and with it the system of bright and glittering colours which rendered it so perfect in itself, and in its relation to all surrounding things. Deprived of these bright influences of climate, we find it in our own country no less beautiful in itself, but wanting in a due harmonious relation to the tone of colour it is brought in contact with. To remedy this—to naturalise the art, in fact—the artist should be content to trust rather to harmony of design than to chromatic effects; so that the eye, uncaught by a general sensation of brilliancy and glitter, may repose upon the quiet harmony of the design; and this remark we make as applying more or less to all mosaic, and entering as a matter of consideration into every application of which it is capable in this country, though more particularly in reference to the especial description executed by Mr. Stephens.

In rejecting strong chromatic effects, however, we would not be understood to sanction neglect of the very material aid afforded by colour in giving life and purpose to mosaic; but we would have it studied with a view to its creating as many varieties of pattern as can possibly result from the introduction of a limited range of colour upon a uniform series of designs. For instance, how many varieties of pattern the eye is able to trace from the simple repetition of a six-rayed star of uniform colour upon a ground broken into triangles by the introduction of two other colours to complete the triple harmony! This is an unfailing charm in mosaic: however simple or however complex the construction of the design, viewed from a distance, the eye is con-

stantly discovering, without mental effort, fresh combinations which, arising out of natural and fixed laws, communicate pleasure to the beholder.

To encaustic tile-work and its imitations the figures of snow appear peculiarly suggestive; and it is remarkable that a few of the patterns preserved to us from antiquity are exactly similar to the nuclei of some of the snow crystals. In this application, far more than in the conventional glass mosaic and its imitations of which we have been speaking, we are compelled to seek effect in symmetry of design. Necessarily excluded from imparting the idea of raised surfaces, such being inconsistent with the intention of flooring, which is to present a level surface to the eye and feet, we are also confined to a very limited range of colour, in order not to interfere with the decorations of the walls and ceilings, and the manufacture of encaustic tiles being in itself limited to the employment of but few colours. Thus excluded from the rich and subtle harmonies of colour, and the relievo of light and shade, our attention is principally directed to the design which, in regard to this application, should combine simplicity with uniformity of outline, and be easily referable to a purely geometric base. And here we may add, in regard to the figures of snow, that, whether in outline or in relievo, they are equally symmetrical. In the one case they are simply enlarged copies of the general effect to the naked eye; in the other they present to us structural details only visible by the employment of a high-power lens, or as seen by the aid of a microscope.

An equal range of adaptation is likewise open to them in

regard to floor-cloth, which involves attention to the conditions above mentioned as referring to tile-work, but in a less degree, inasmuch as its more household and domestic applications allow a somewhat greater latitude in fancy and colour. As suitable for canvas, they will admit of various supplementary borderings and intricacies of pattern, conceived around them in the spirit of the original design, and serving as a means for the introduction of the colours most commonly employed in this branch of manufacture.

In regard to the figures of snow we have two distinct suggestive ideas in reference to their application,—the one, that of ingrafting them into different styles of ornament for their further extension into new forms; the other, that of their adoption to various decorative purposes now usurped by designs or patterns which, in part sanctioned by use, are greatly censurable on the grounds of fitness and taste. In the latter spirit we consider that they may be most usefully applied to paper-hangings, although of late in this branch of design there has been a manifest improvement. Not long ago the "artist" who presided over this department, and whose influence was felt more or less in every home of the kingdom, had no guide but his own ill-educated and distorted will; he threw things together without the least regard to harmony of colour, fitness of proportion, or form of any kind, and called the heterogeneous mass "a design." Latterly he has had better opportunities for the acquisition of knowledge; but what is of far more importance, he has had better-informed critics. In some instances his task has preceded, in others it has followed,

that of his customers; but assuredly we do not now often see upon our walls the monstrous perpetrations which disgraced those of our childhood. If the paper-hanger will examine this collection of suggestions from Nature—from Nature as she exhibits only one phase of grace and beauty—we feel sure that he will be at once convinced that their adoption will be of immense value to him.

There is one application yet to mention, which we have reserved to this place as involving somewhat lengthy consideration—that of their adaptation to the manufacture of earthenware and porcelain. The ungainly and unmeaning spots that are so often put upon plates, and the distorted ornament which so frequently degrades cups and saucers and jugs for ordinary domestic use, we hope may, to a great extent, be displaced by these snow crystals, which, varied to infinity, would cause the eye and mind to receive that refreshment which arises from the true and beautiful; nor are we without hope that they may ultimately be received into the higher application to porcelain. We all know that porcelain has long enjoyed a monopoly of the most tasteful designs that art could suggest, whether of birds, flowers, medallions of figures, or arabesques; but we are in hopes that they may suggest a few novelties of designs to this the most favoured medium for the display of the natural and beautiful in art. This hope of itself suggests the question, How far have the beauty and symmetry of the geometric figure been acknowledged and employed hitherto in their designs? The answer to this question involves an inquiry into the history of designs as applied to

pottery, from its first crude attempts at the delineation of natural objects to the present time, when, both in England and abroad, it has attained to such great perfection. As a distinct inquiry this is scarcely less interesting than instructive, leading, as it does, the student in design to a correct knowledge of that which is beautiful and appropriate rather than conventional. As an important aid to such knowledge, the Ceramic collection at the South Kensington Museum offers a means of study to the student in ceramic design. The most crude attempts, dating from the conclusion of the fifteenth and the beginning of the sixteenth centuries, are easily distinguishable by the rude outlines they exhibit of men and animals and flowers: in some cases strictly imitative, so far as the skill of the workman has permitted; in others, fanciful and grotesque. In some specimens belonging to this period of art are attempts at creative design in the geometric precision with which similar forms of leaves and interlaced patterns are represented, chiefly described in shades of the same colour upon a uniform ground, and differing much in regard to the accuracy with which they are executed. Some of the subjects chosen are religious, including representations of our Saviour; some allegorical; and others, again, heraldic devices. The rude, but flowing, and sometimes evolved, designs of the interlaced and outline patterns are chiefly borrowed from leaves and flowers, rather than based on principles of geometry; the colouring also is bold and prominent, in conformity with the spirit of the design, and exhibits the primaries blue, red, and yellow, but slightly tempered by the milder and

subsidiary tints, upon which, at a later time, the painters of Majolica knew so well how to rest their most soft and agreeable effects.

Of the Raphael ware, so well known and so highly prized by connoisseurs, little here need be said. Raphael, in his early youth, is supposed to have devoted some time to the painting of Majolica, and hence its name at this period and for some time beyond. Whether or not the easy grace and spirited style of these paintings, chiefly allegorical, though representing sometimes passages from history, and the harmonious softness of the colouring, give intrinsic value to the most trifling specimens of the art, whether for ornament or domestic use (and many rich specimens still remain to attest their value, and the exuberant taste and imagination of those painters who were content to trust their creations of fancy to so brittle a medium), to them the designers of the present day remain indebted for a certain freedom and unconventional display of art, which, restrained and modified, long exercised an influence on design, and is traceable even now.

A few years later an entirely new class of designs was originated by Palissy, master potter to Francis I. This eminent ceramic artist, born in France, was the originator of the Palissy ware, scarcely less known than that of Raphael. His works are executed in relievo, and are distinguished from others of the period in the choice of subjects, which are chiefly drawn from natural objects, such as plants, reptiles, fishes, &c. Among the specimens known by the name of Palissy ware are rustic baskets

designed on a strictly geometric base of divergent lines from the centre to the circumference, partly in relievo, and very effective in style and composition. The chief merit of this artist consists in his fidelity to Nature, and an original whimsicality of conception. Passing on from Palissy, we come, many years later, to specimens of china of a tasteful degree of ornament, that would do no discredit to the porcelain works of the present day. Here, in the central medallion, is a group of figures, Raphaelesque in their easy grace of outline, yet highly studied, and claiming the rank of a finished picture.

The Berlin porcelain illustrates the perfection of that union which combines the imitation of the beautiful in Nature with the less sensuous beauty of the geometric figure. In the Sèvres porcelain, in the same collection, the geometric figure rises to higher importance, forming in the beautiful "Versailles Service" a framework for the jewels which enrich the exquisite centre medallions.

The impression we derive from retracing the history of the past is, that the geometric figure has rarely been employed as a principal agent in decoration. We are speaking still in reference to the period we have been considering, and which is one calculated to trace with effect the progress we have in view. Prominent among the earlier specimens is the delineation of simple forms borrowed from Nature, repeated with indifferent fidelity of execution, and spread over the entire surface of the piece; whilst in later times, when the mechanical processes improved and admitted of greater accuracy, we find it restricted to

light and artificially constructed borderings, so arranged as to lend additional beauty to the freedom of colour and design elsewhere displayed; and we gather, also, that if in the works of high art we find it nowhere unmixed with designs of a less formal character, there is scarcely a work that is not indebted to the grave and conventional arrangement of pattern founded upon a genuine knowledge and elucidation of its principles.

It has ever been greatly against the very general adoption of geometrically constructed figures to the purposes of porcelain, that the unaided hand of the draftsman is insufficient to insure the requisite accuracy of outline—a difficulty which even at the present day limits to a very great extent their employment in this department of art. Still, we are led to hope that the figures of snow may prove suggestive of a new basis on which to construct designs no less symmetrical than those which we have seen to proceed from other and better-known sources; whilst the rate of modern improvement in most branches of industry leads us to hope that this difficulty before long may become less formidable, and that improvements in printing will enable manufacturers to repeat with tolerable cheapness patterns which have been confined to the more costly articles of luxury. Of modern applications one in particular occurs to us—it is that they may aid in the formation of a set of ice-plates for the dessert or supper table. We can imagine the ground of the plates a clear light blue; in the centre may be the crystal, selecting in preference from those forms which are most crystalline and arborescent; among them, that most graceful of all, the water

crystal, distinguishing it from the ground by shades of grey, which should be so distributed as to impart to the copy the frosted effect of the original. Around the centre, and immediately beneath or upon the raised margin of the plate, might be arranged a circular bordering, similar to that we have described as surrounding the margin of a pond on its first congelation, when the needles, becoming incrusted with crystalline deposit, assume the appearance of frosted ferns.

There is yet another application that suggests itself to us, although the beautiful designs on porcelain executed by Messrs. Copeland & Co. scarcely leave anything to be desired by the most fastidious; we refer to the painting of tiles or slabs of porcelain, to be mounted in frames of silver, or wood, for ornamental or domestic purposes, and for which, of late, there has been a large and increasing demand. Fig. 44 (page 174) is designed for this application from one of the snow crystals.

To turn to yet another and far wider scope which may hence be given to the cotton-printer, millions of "dresses" issue every year from Manchester. For those which are intended to clothe "the masses" there is usually little attempt at design. A simple form of a single colour is all that is sought for, and the puzzle is, how to obtain variety. Here is a book of patterns, no one of which has ever been used; leaf after leaf may be turned over, "and still find something new"—something that may be copied as it presents itself, something that will be suggestive.

Our references have been made to but a few of the arts which may be—which must be—largely influenced by this power to

resort to another means of teaching; but it is obvious that there is no branch of manufacture which may not, to some extent, be benefited by it. Let the student give the subject a moment's

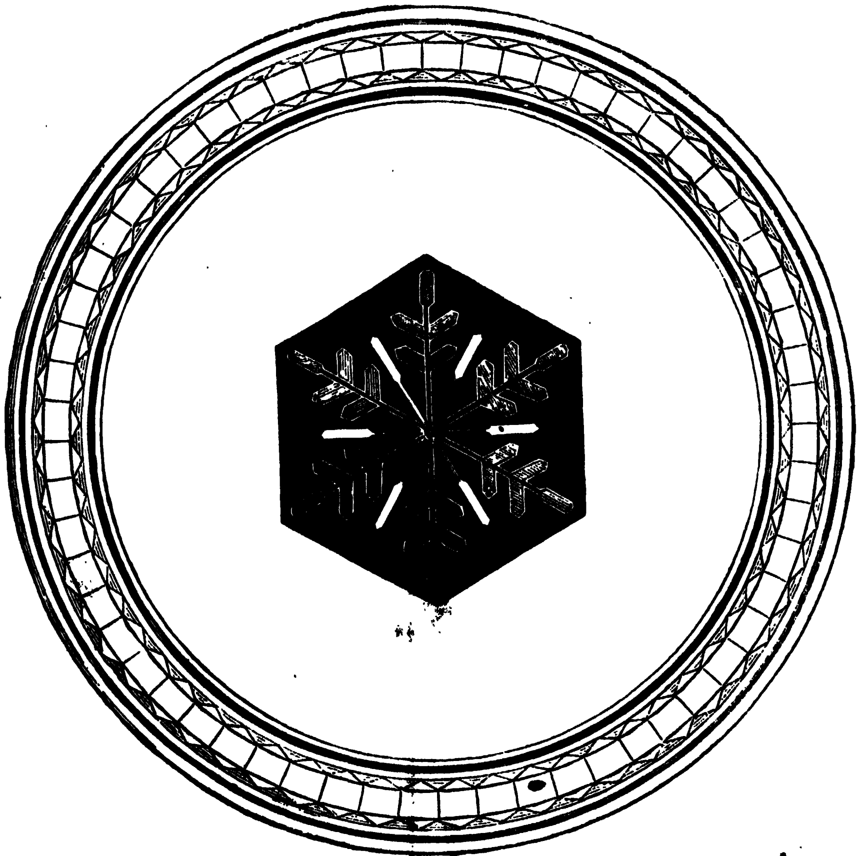


Fig. 44.

thought, and he will be convinced of this; let him look down to his carpet, or up at his ceiling; let him turn to the cover of the

book he is perusing, notice any part of a lady's dress, or of his own, where ornamentation is admissible; let him, in short, consider any object, anywhere, under any circumstances, and then examine the few examples we set before him in these pages, and he will at once perceive how much of harmony, of truth, of beauty, may be obtained by an intellectual study of these forms, which are neither more nor less than Nature's teachings from a book hitherto unopened.

IV.

THE SYMMETRICAL AND ORNAMENTAL FORMS OF ORGANIC REMAINS.

By ROBERT HUNT, F.R.S.

THE SYMMETRICAL AND ORNAMENTAL FORMS OF ORGANIC REMAINS.

I.

THE most useful as well as the most ornamental devices which have sprung from the exercise of human ingenuity have all been founded upon the varied and beautiful creations which Nature has presented to us. It is not within the limits of human power to create, but from the impressions made upon the mind an unlimited variety of combinations may be formed. By the mental kaleidoscope an infinite change of form is produced by the re-arrangement of a few simple elements of beauty. The ideal head of the Grecian sculptures is but a refined reproduction of the lines of grace and beauty which the observant artists had seen in, and selected from, the intellectual features of the educated Athenians. Architecture, too, has liberally borrowed from the perfections of the human form. In the symmetry of the Ionic columns, and in the graceful strength and grouped elegance of the Caryatides, we trace the best proportions of the perfect woman; and in the flowing beauty of their ornamentations we may discover a reproduction of some of those caprices which are the spontaneous growth of the female mind. Architecture has no

less liberally borrowed its styles and ornaments from other natural sources: from the arched cavern and the bowery forest tradition draws the form of the Egyptian temple and the Gothic fane. The chalice-like flower of the lotus of the Nile ornaments the columns of Luxor; the acanthus foliage decorates those of Corinth; and in numerous other instances the artist has sought to weave the simplicity of vegetable forms into the texture of his work, for the purpose of insuring a general character of lightness and elegance.

Whether the ancient potter selected the shapes of his fictile manufactures from the foliage of the forests of his land has been frequently discussed. It is sufficient, at present, to know that the elegant curves of the Athenian and Etrurian vases, which have through all periods been regarded as beautiful, owe this high appreciation to the simple fact that they are true to the lines which Nature has herself adopted. The true is always beautiful, and in whatever form it may address itself to the mind, it exerts over it an uncontrollable power for good. The impulses of Nature are ever in the direction of perfection, and we find, even in the exercise of the mysterious physical forces which bind the atoms of matter into a mass, that a constant tendency is exhibited towards an arrangement which shall observe the utmost symmetry. In the inorganic world we have crystalline forms exhibiting an obedience to the most perfect geometrical laws; and in organic creation—from the lowly lichen to the stateliest tree, from the infusorial inhabitants of a drop of water up to man—we have molecule combining with molecule in a myriad ways, but in all

of them producing results which charm by their adaptation to circumstances, and in the perfection of every organ.

The efforts of man to convey to the canvas the resemblance of humanity—to impress, by the agency of a few colours upon his tablet, a reflection of the mental operation as it is seen "breathing through the face" in love and sympathy, or disturbing the features with agony or sorrow—is but an exalted effort of that desire which moves the entire race to copy the phenomena of Nature as they present themselves to our senses. It is the prevailing character, and, indeed, the distinguishing feature, of the human race, that it delights in imitation: the child in its play, and the man of talent in his studio, are equally exemplifications of this fact. Man has ever gone to Nature for his inspirations. If we examine the rude productions of the savage who is awaking from his merely animal existence, and over whom mind is beginning to assert its power, we discover that his first impulses are to gleam from the organized forms around him such objects as he conceives will add something to the adornment of his body. When he commences to produce any of those aids to existence which are the earliest efforts of technical art, we still see he rudely attempts to copy some familiar natural form. Whether we select from Greece "those faultless productions whose very fragments are the despair of modern art," the almost breathing marbles of Phydias—whether we take the sun-baked pottery of ancient Egypt or of Central America, the "art-manufactures" of a primitive people, or those manifestations of an educated taste which Greece, Rome, and modern Europe afford, we shall find

that in all alike the effort to imitate the works of Nature is the prevailing tendency. And, beyond this, we shall learn, too, that where the simple beauties of Nature have been approached—seldom have they been realised—the art-production has become the glory of the age and the boast of the country to which it belongs. We sometimes find that human intellect, proud of its comparatively high achievements, quits that almost stern simplicity which distinguishes Nature, and aspires to produce effects by violent contrasts and glaring characteristics; but the result is invariably the fate of Dædalus, whose flight on waxen wings was punished by a fearful fall. The departure from Nature in the works of art marks, like a widespreading mildew, the decay of nations; and this is readily accounted for. As good taste invariably indicates a feeling of the presence of that intellectual beauty,

"The awful shadow of some unseen power,"

which consecrates all that it shines upon, and gains an ascendancy over the gross sensualities of life, so a departure from it exhibits the operations of those feelings which have their origin in the depravity of the race.

Our artists and our artisans have sought busily over the surface of the earth for subjects on which to labour. Herb, shrub, and tree, leaf and flower, have been copied to ornament the works of their hands. The sea has yielded its organic forms, and the workman has sought, amidst the finny tribes and the shelly wonders of the great deep, for subjects to aid his decorative designs. The insect, the bird, and the beast have equally

ministered to the exercise of fancy; and the inventive powers of the imaginative have not unfrequently attempted to blend the three kingdoms of Nature in one device, in the eager search for that novelty which generally gains a host of admirers. Leigh Hunt with truth exclaims, "We know not a millionth part of the wonders of this beautiful world;" and it is but slowly that science is discovering to us new subjects of admiration; but though slowly, science is steadily doing so. The truths of science are constantly serving the progress of art, and the more we free the labours of the philosopher and the experimentalist from the technicalities which are too frequently only retained to give a false appearance of learning, the more certain will be the advantages to be derived by the student of beauty from the labours of stern induction. The union of Vulcan and Venus tends to the diffusion of peace and happiness.

Although Natural History is found giving its aid to almost every division of ornamental art, there is one branch of it, Geology, which has rendered but little service to the artist. Yet here is a vast field, spread over an earth-wide space and comprehending almost infinite time, teeming with forms the result of the most varied organizations, which has scarcely yet been touched. This arises from the circumstance that the study of organic remains is itself a science of very recent date. Palæontology is but of yesterday; yet it has achieved important results, The study of the forms of animal life which existed in the earth previous to the creation of the present races which inhabit it is replete with the highest interest. As Astronomy penetrates the

mysteries of space, so Geology pierces the arcana of time. The rock formations tell of the earth's mutations, and the remains which they hold, as histories of former ages, show that the beings which possessed the earth as a dwelling were as perfectly adapted to their conditions of existence as any living examples of creative intelligence can be. Nor were they wanting in beauty. A study of the cabinets of the curious—or of the metropolitan and many local museums—would at once carry conviction to the mind, that amidst the host of fossil remains with which we are now acquainted is to be found a new variety of forms admirably adapted, by their symmetry and general character, for the purposes of ornament.

It will be found that stored in the rocks are creations which lived and breathed ere yet the great mutations had occurred which give to the earth its present physical features. From the coral-like structures of the Laurentian rocks—probably the earliest evidences existing of any organized structure—we may pursue our studies over the infinite variety of form which the Cambrian and the Silurian rocks preserve, until we arrive at that period when the Old Red Sandstone sea, teeming with life, washed the rock of that archipelago which has grown into the British Isles. Advancing to the study of yet more recent rocks, we may select the inhabitants of inland seas and the immense savannahs of an early world, which for delicacy of structure and elegance of design are not to be surpassed by any of the productions of organic life now existing. Here, then, is a yet unploughed field from which the art-manufacturer may cull fresh forms. We can only direct

attention to the source, and give a few illustrations in proof of our assertions: having done this, we must leave the industrious artist to search for himself in geological cabinets and palæontological plates for those forms which may suit his purposes and please his taste. With the exception of two highly imaginative pictures by John Martin, of "The Country of the Iguanodon," illustrating Dr. Mantell's "Wonders of Geology," and "The Book of the Great Sea-Dragons," by Mr. Thomas Hawkins, in which a realisation of the condition of the earth during the period when it was the abode of those monstrous reptiles whose fossilised bones tell the tale of their ferocity and power, is attempted and ably conceived, art has not ventured into this abyss of time.

Whether the hydras of superstition or the griffins and dragons which are preserved in heraldic bearings are dim outshadowings of those ancient days, preserved like a myth amongst men, it were vain to speculate, although the speculation is fraught with interest. It is, however, curious that we find those strange remains of the old world linked to superstitions which have their origin since the introduction of Christianity.

It is therefore evident that those remarkable fossil forms must have excited the wonder of man ere yet science bent to the task of studying them. The graceful form of the Nautilus, which now enjoys existence in our tropical seas, is familiar to all. A large variety of molluscous animals of the same genera have existed through all time; and their remains found in the fossil state prove them to have been among the earliest inhabitants of the ancient ocean. In nearly all the rocks of a limestone character the

remains of Ammonites—the ancient Nautilus—have been found. In the Oolite, the Lias, and the Chalk, varieties of these elegant shells are constantly discovered, and nearly three hundred species have been named. From these we select a few, which will, we think, show that they are well adapted for ornamental purposes.

The first we give is the *Ammonites Eudesianus* (Fig. 1), which is found in the inferior Oolite, a variety of the sandstone rocks; the specimen from which our illustration is taken being from the sand-

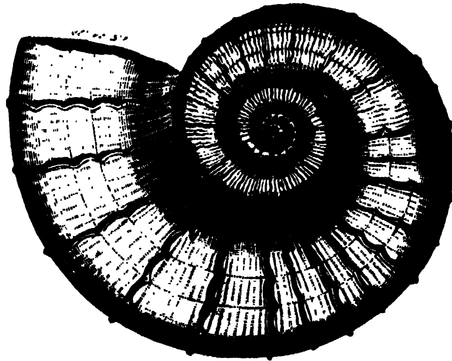


Fig. 1.

stone rocks of Caen, so well known in this country from the great quantity employed in our architectural ornaments. This example is remarkable for the perfection of the spiral lines and the beautiful disposition of the ribs or elevated portions, which serve to strengthen the delicate chambered shell.

The *Ammonites cordatus* of Sowerby (Fig. 2) is distinguished by a spiral of a different order from that of *Eudesianus*. Its ribs forming graceful waving lines, and terminating in a denticulated

edge, give a very symmetrical character to the architecture of this variety.

The *Ammonites cristagalli* (Fig. 3), in which we have an arrange-

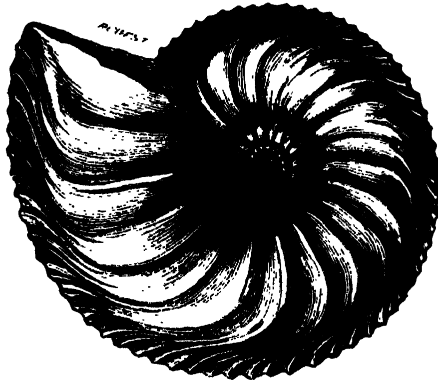


Fig. 2.

ment of the convolutions not very unlike the last-named species, differs from it in the disposition of those folds which form the sup-

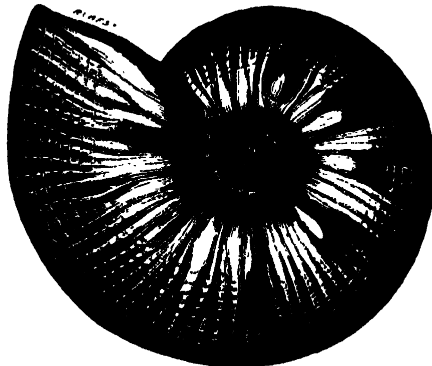


Fig. 3.

ports of the arch of the shell, by which a very charming though simple character is obtained.

The *Ammonites muticus* (Fig. 4), found in great abundance in the marls of the Lias, is remarkable for the very curious arrangement of tubercles or spines, which are formed by the elongation of the folds of the shell. Notwithstanding the general defect which arises from the repetition of angular lines, we have in this shell an example of the harmony which may be produced by them when

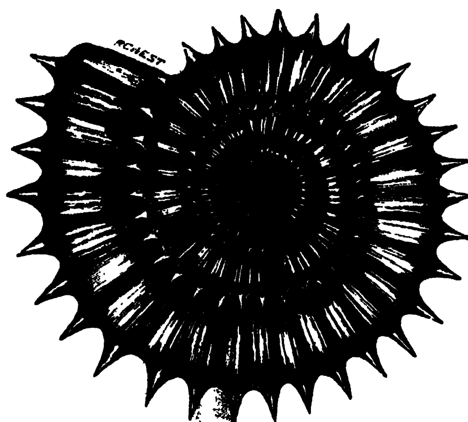


Fig. 4.

arranged upon a uniform system. The radiating effect of these tubercles ranged around the involutions of the shell is very pleasing.

The *Ammonites Grenouilloxi* (Fig. 5) offers another variety, which shows the folds gradually being elevated, as these approach the mouth of the shell, into bosses, by which, of course, increased strength is secured where the shell becomes more open, and consequently weaker; at the same time they give a pleasing variety to the form of the shell itself.

The *Ammonites contrarius* (Fig. 6) presents many distinguishing characteristics, which are important to the naturalist as distinctive markings, and furnish the artist with a variety of simple elegance which deserves his study. The peculiar arrangement of the ribs, curving off right and left from a line running along the centre of the shell, gives rise to the formation of a series of festoon-like ribs, which add much to the general beauty of this species.

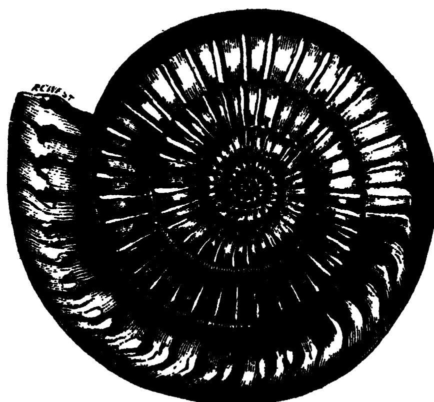


Fig. 5.

"The general principle," remarks Dr. Buckland, "ot dividing and subdividing the ribs, in order to multiply supports as the vault enlarges, is conducted nearly on the same plan, and for the same purpose, as the divisions and subdivisions of the ribs beneath the *groin work* in the flat vaulted roofs of the florid Gothic architecture." In all these arrangements, and also in the bosses or tubercles, we have varieties giving both additional strength and beauty. A striking uniformity is found to prevail in even those shells of the Ammonites which seem the most complicated; and

the elegance of their general appearance will be found to be due to the repetition, at regular intervals, of one symmetrical system of forms. In many of these fossil shells the pearly plates are dovetailed together in a curious and beautiful manner, the regular disposition of the sutures producing a very elegant foliated appearance. The charm of all these forms, and also of those

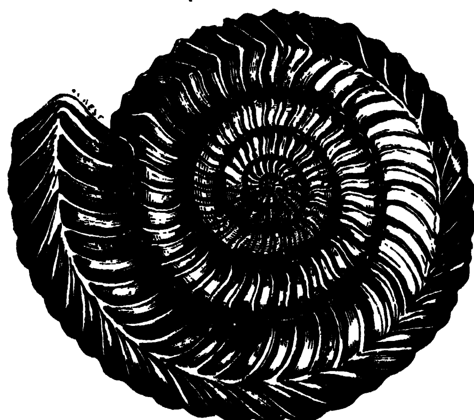


Fig. 6.

fossil shells which are allied to the Ammonites, consists in the pleasing impression which is given by the gracefully curved outline, and the waving lines by which the shells are banded.

Among the Pectens—a class of shells common to the Sussex chalk—will also be found a great number of forms which, although not unlike many modern species, differ from them in some striking features, and which, independently of their novelty, are so very elegant that they seem peculiarly fitted for ornamental purposes. It has been with much difficulty that we have chosen

two or three illustrations from this class, and we still feel doubtful if our selections exhibit the most favourable samples of theii symmetry.

The *Pecten quinquecostatus* of Forbes, the *Janira Atava* of

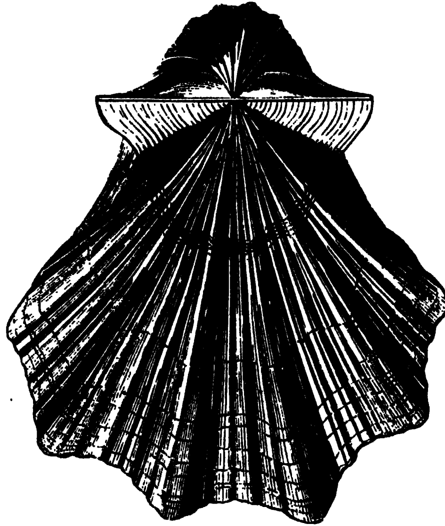


Fig. 7.

D'Orbigny (Fig. 7), is a beautiful semicircular shell, with a regularly denticulated edge, its surface being covered with fine transverse

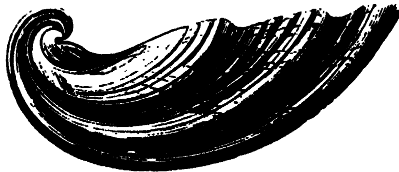


Fig. 8.

striæ. The woodcuts of the *Pecten* or *Janira striatacostata* and the *Pecten Dujardinii* (Figs. 8 and 9), serve to exhibit other varieties

of these fossils, and at the same time to show the elegant curvatures of these shells, when viewed in different positions.

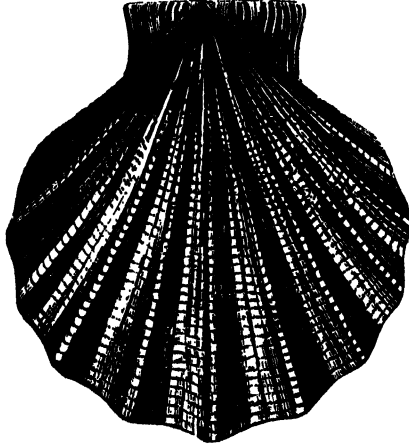


Fig. 9.

The *Trigonia carinata* (Figs. 10 and 11), one of a class of fossils

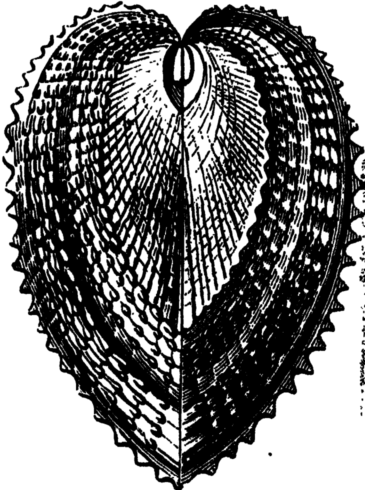


Fig. 10.

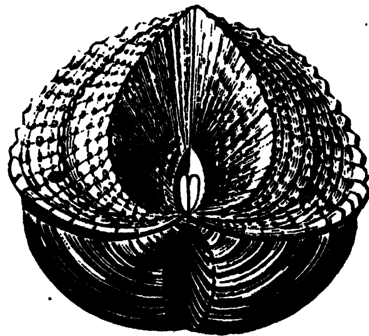


Fig. 11.

which has particularly engaged the attention of Agassiz, is also

found in the Cretacean series. It is figured in two different positions, that the elegant outline and the ornamental radiating striæ, regular tubercles, and denticulated margin may be fully seen.

In the *Cardita* we have the same heart-shaped form, but the ornamental surface is in many respects different. The regular curved lines proceeding from the hinge of the shell, which is itself most delicately formed, present in the *Cardium mutonianum*

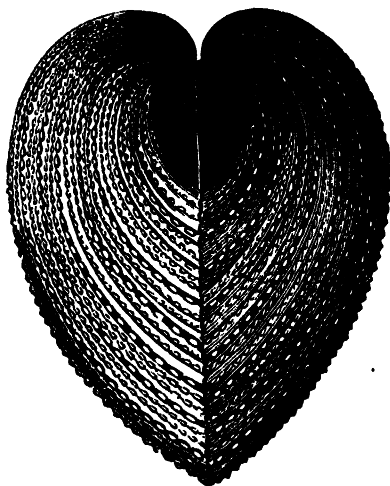


Fig. 12.

(Fig. 12), the *tuberculata* of Sowerby, a most pleasing arrangement of striations. The regularity of these, as shown in the woodcut, particularly recommends this specimen and others of its class as admirably adapted for ornamental purposes, where very delicate and elaborate workmanship can be admitted.

The *Opis Sabandiana* (Fig. 13) is another of these elegant shells more remarkable for the regular form of its outline than for any

elaboration of the striæ which traverse it, in this respect standing in pleasing contrast with the preceding figure.

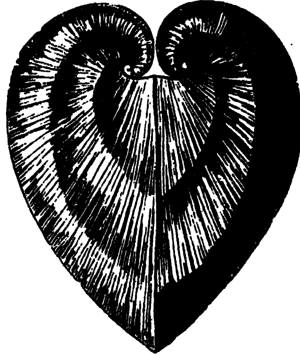


Fig. 13.

Among the *Trigonia* will be found a vast variety of the most symmetrical forms, most of which are elegantly ornamented.

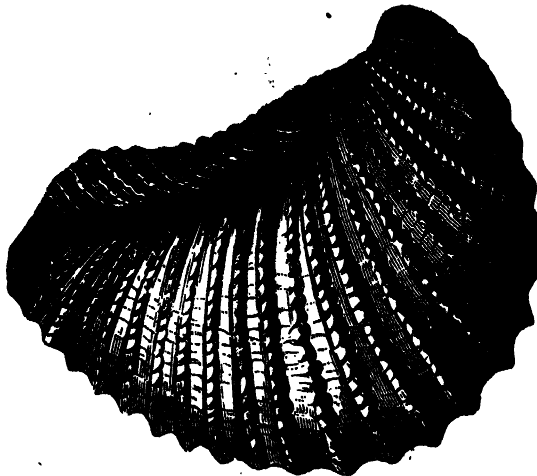


Fig. 14.

The two representations which we have given of the *Trigonia scabra* (Figs. 14 and 15) will convey a general idea of the more

striking characteristics of this class of fossils, which are found distributed abundantly over the Portland rocks. The manner in which the folds of the shells overlap each other is singular, and gives to them often a very striking resemblance to the foldings of leaves in the leaf-bud of plants. The curved lines, formed by the small bosses regularly elevated from the striæ, running transversely to these lines in many species, give an exceedingly pleas-

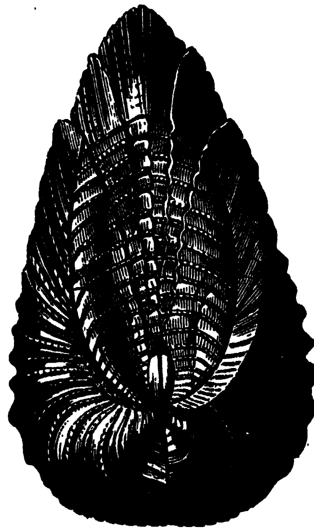


Fig. 15.

ing outline, which certainly adapts these Trigonia, from the variety of forms thus produced, to the purposes of the art-manufacturer in a peculiar manner.

By the wonderful transmutation of organic structures, by those natural processes

> "Which turned the ocean-bed to rock,
> And changed its myriad living swarms
> To the marble's veined forms,"

we have preserved specimens of the early creations, rivalling in beauty any of those which now exist.

If we can but show that a series of novelties for art may be found by searching over the charnel-houses of the ancient world, possessing the charm of symmetry and that beauty of arrangement and decoration which adapts them, as we believe, to numerous ornamental purposes, we shall be satisfied. We do but suggest an examination. We have confined ourselves to a few of the numerous remains of animal life. "The sermons in stones" are varied beyond the conception of those who have not attempted to read them.' Between the earliest attempts of Nature to form a cell in which life should exert its mysteries, up to the most elaborated and gigantic form which ever swam in the ancient waters or roamed in the wide savannahs, there is one unceasing, never-failing effort to multiply the beautiful, and to make it conformable to the useful. In conclusion, we may again remark that whether we seek to copy from Nature her older or her more recent works, we shall find in them all that peculiar charm which

"Can so inform
The mind that is within us—so impress
With quietness and beauty—and so feed
With lofty thoughts,"

that the results of that study will be the production of beautiful works, all tending, by their spells, to elevate humanity.

II.

In the previous chapter we confined ourselves to a selection of a few fossil shells, with the hope of drawing the attention of the art-manufacturer to a source whence he may gather, from thousands of examples, forms of the utmost symmetry, which appear to fit themselves in a peculiar manner for his especial purposes. The beauty of vegetable forms has, through all time, won the attention of the artist. The lotus and the acanthus are rendered classical by their numerous adaptations to ornamental uses. The ivy and the laurel, the nepenthe and the convolvulus, with numerous other plants and flowers, are to be found moulded and painted on works of ornament and utensils for domestic use through all ages.

Numerous and ever graceful as are the forms of the living vegetable world—and these have been extensively copied—there is a vast field within which diligent search will discover a great variety of plants, which are no less beautiful and far less common than their living analogues, in the bygone flora preserved so strangely in those strata which mark the mutations of our mysterious world.

The flora of the Carboniferous period was of a most extraordinary character, and luxuriant to an extent far exceeding even that which is now exhibited in the forests of equatorial climes. Growing most rapidly and of a lax tissue, these plants were of short duration, and were after death rapidly converted into a mass of uniform structure, such as we have now exhibited in every bed

of fossil fuel. Three hundred species of plants belong to the Coal formations of Great Britain alone; and it is found that local causes, with which we are not acquainted, have modified in a strange manner the plastic vegetation of this period; and in what appear to be analogous positions we find whole genera and even orders of plants of very opposite botanical character, presenting a greater disparity of vegetation than countries the most remote in geographical position.* Thus within a small area we have a variety of strange forms, few of which do not adapt themselves for ornamental purposes.

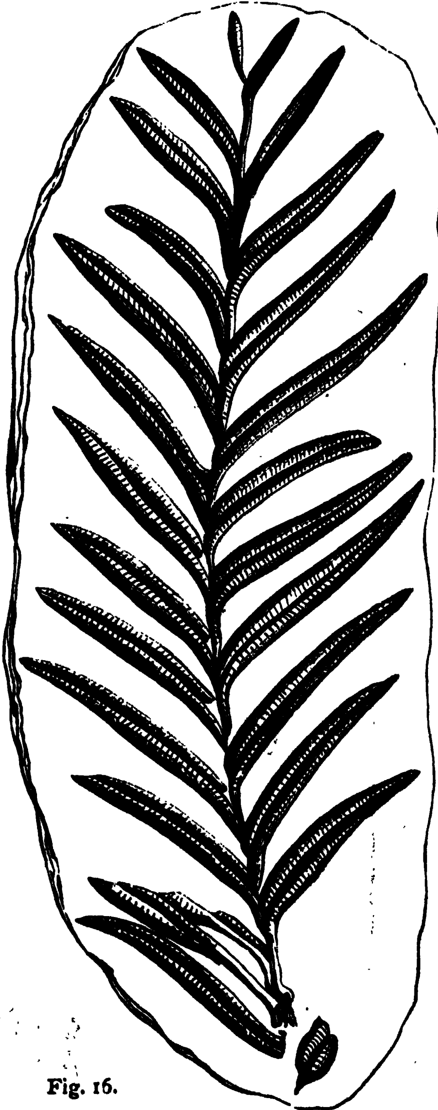


Fig. 16.

Fig. 16 is the *Pecopteris lonchitica* or *Mantelli*, a fern abundantly found in the

* See Dr. Hooker "On the Vegetation of the Carboniferous Period," *Memoirs of the Geological Survey of Great Britain, &c.*, vol. ii.

coal-beds of Newcastle-on-Tyne, which is indeed allied to some of the existing ferns of New Zealand, but differing from them in many of its markings. The graceful arrangement of the frond particularly distinguishes this species.

Our next figure, the *Pecopteris oreopteridius* (Fig. 17), is copied from a specimen found in the coal shale of France, as is also

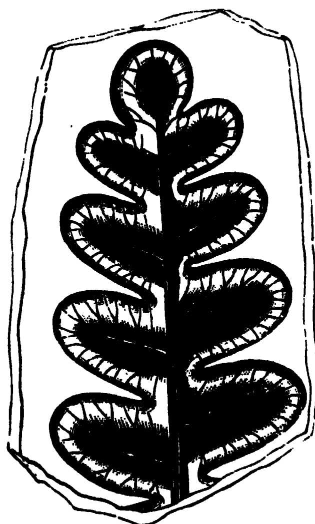


Fig. 17.

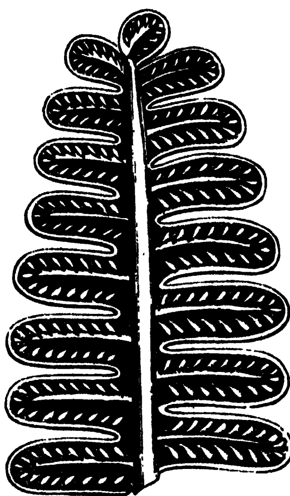


Fig. 18.

Fig. 18, the *Asplenites nodosus*, although this singularly and prettily marked plant is frequently found in other coal districts. In the ferns of the present period we have none which exactly resemble these varieties, and they appear capable of being arranged by the artist into ornaments of an exquisitely graceful character.

Of these kinds numerous varieties exist in the fossil state, in which the alternating arrangements of the fronds, and the systems

of venation, present many pleasing differences. These petrified plants, which grew in the enormous deltas of our island and the Continent which now form the known coal-fields, are often preserved with a delicacy which we could scarcely have expected from the conditions of putrefaction and rapid disintegration which must have gone on around them. And not unfrequently we have

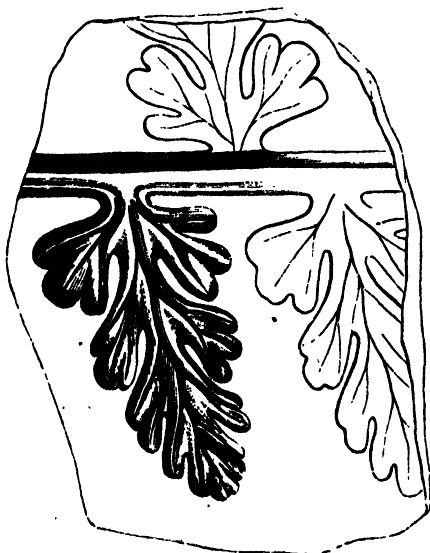


Fig. 19.

singularly beautiful remains of the dissected leaves of these plants (Fig. 19), this being effected doubtless by the action of water on the softer portions of the leaf.

The *Sphenopteris tridactylites*, which exhibits in the arrangement of its fronds one of the most symmetrical forms to be found among this elegant class of plants, can scarcely be sufficiently exhibited in the space we are enabled to afford. It is abundant in

the shales of the mines of Montrelais. In the same district is also found the *Neuropteris Heterophylla* (Fig. 20), which is remarkable for the arrangement of its fleshy leaves and the regularity of its

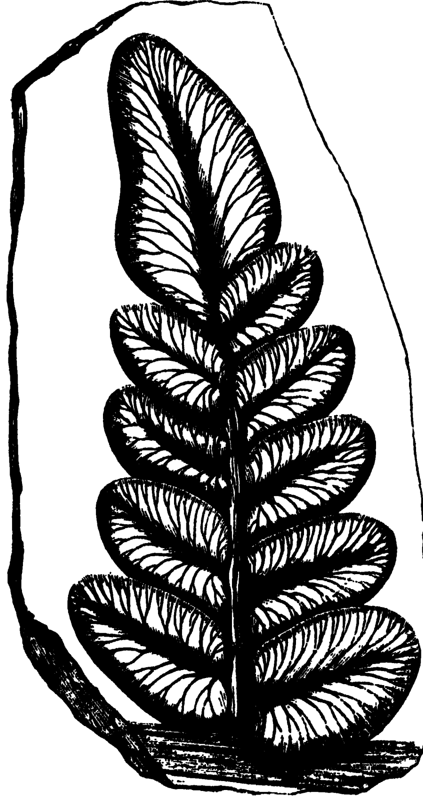


Fig. 20.

venations. It must be remembered that our drawing only represents one of the fronds. The grouping of the whole on the straight and slender stem is very beautiful.

The *Pecopteris Whitbiensis* (Fig. 21), which presents many

differences from the other forms, is copied from a specimen found in a nodule of argillaceous ironstone from the lower shale at Cloughton, and certainly it presents many points of interest.

Among the most remarkable and characteristic plants of the coal formation is the *Sigillaria*, of which extraordinary trailing plant upwards of sixty species have been described.

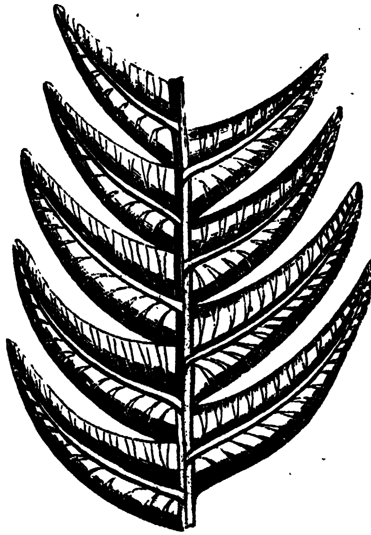


Fig. 21.

These plants are generally but a few feet in height, though sometimes two yards broad.

Although of universal occurrence, it is singular that it is unaccompanied by any evidence of branches, leaves, flowers, or fruit. The peculiarly lax condition of this enormous tree fern has prevented the preservation of many of the beautiful markings by which the trunk must have been distinguished.

In our selection from such as have been discovered we have given two striking varieties, the first the *Sigillaria elegans* (Fig. 22), as it is figured by Brongniart, and the *Sigillaria Defrancii* (Fig. 23) from St. Ambroise, both of them distinguished by the beauty of their markings. It will be evident upon examination that these strange vegetable wonders of an early world bear a relation to the recent Coniferæ; but this subject, which is one of anxious dispute among fossil botanists, need not detain us. Amid

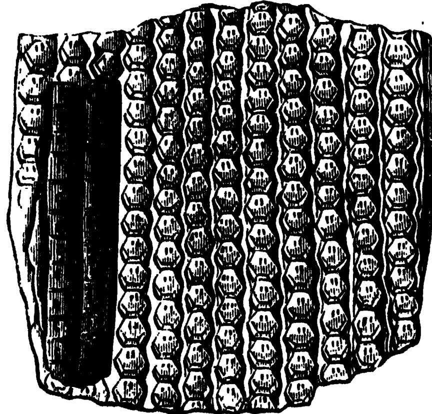


Fig. 22.

the many varieties of Sigillariæ and Lepidodendrons which are associated with them numerous exquisitely delicate markings occur. The sections of these plants too present, in their medullary rays and slender vascular tissue, systems of arrangement which are curious and ornamental.

Having suggested—and we aim at nothing more—that the fossil flora might furnish many tasteful ornaments to the art-manufacturer, we pass hastily to an equally brief and merely

suggestive notice of the immense variety of fossil forms allied to those of the coral formations now progressing in the Pacific. The modern corals present to us a great diversity of structure, but they are excelled in all respects by those of the old world. The remains of these labours of insect life are exceedingly numerous;

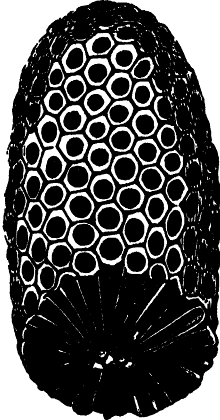


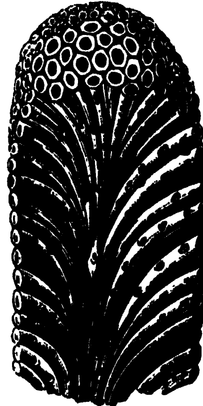
Fig. 23.

entire mountains are built, for the most part, with them; and the coral animal appears to have been as busy in the ocean which washed the cliffs of the Silurian boundary as it is at the present time on the reefs of Torres Straits and over the Indian Seas. Figs. 24 and 25 represent the external appearance and the interior arrangement of the *Calamopora polymorphus* or *Favosites*, which is found at Combe Martin, Ilfracombe, and Plymouth. The arrangement of the tubes or cells, giving to the whole the character

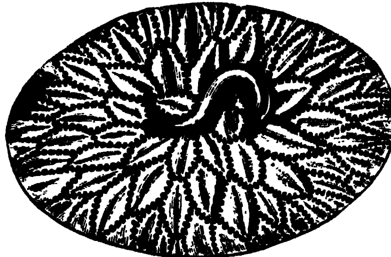
of some of the vegetable productions of the tropics, is very graceful.

The *Pleurodictyum problematicum* (Fig. 26), from the ironstone


Fig. 24.


Fig. 25.

bands on the banks of the Rhine, is singularly elegant. The disposition of the denticulated channels presenting the appearance of a delicate bead-like tracery, marking out a series of leaf-shaped divi-

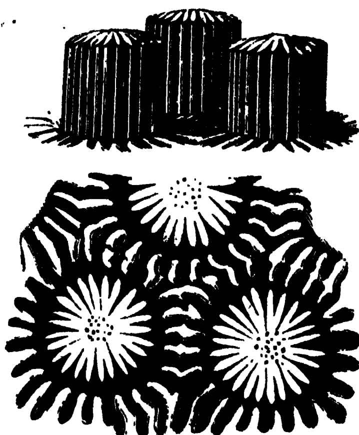

Fig. 26.

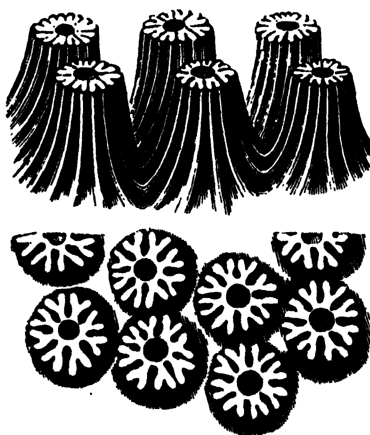
sions, gives great beauty to this variety. In the figure copied the *Serpyllum* curved in the centre adds too, rather than detracts from, the beauty of the fossil. Indeed, the manner in which Serpylla

dispose themselves over many of the corals is singularly graceful and capable of many applications.

The following figures of the *Astræa geminata* (Fig. 27) and the *Astræa rotula* (Fig. 28), showing their external character and the radiations as exhibited in section, are only intended to display the novel and elegant character which prevails through an almost infinite variety of these coralline forms.

These beautiful creations are produced by animals of the polyp


Fig. 27.


Fig. 28.

kind, which, possessed of a power of separating the carbonate of lime from sea-water, are constantly engaged in building up around themselves those stone structures which, if not geometrical in all their arrangements, are strikingly varied and beautiful. The coral animal has left traces of its work on the earliest fossil rocks, but in the more recent or Oolitic series the corals are most abundant.

It is almost impossible to select a specimen from any cabinet

of the corals of the Oolitic period without being struck with the regularity of arrangement and the variety of beautiful forms produced. It is true that our existing corals bear a strong resemblance to those of the seas of the ancient world; but they differ in specific, and often in generic character, and the fossil remains present forms and dispositions of parts widely varied from those of the recent coral. It is curious and interesting to observe, however, in both species, the same contrivances adapted to provide that resistance to the waves so necessary for the protection of the coral animal, and which especially marks its work.

The extent to which these coralline formations have gone on will be indicated by the fact that the coralline crag at Oxford is exposed at the surface, and the bottom of it has not been reached at the depth of fifty feet. One of the limestone beds of the middle Oolite series of England is a continuous bed of petrified corals, retaining the position in which they grew at the bottom of the sea; and beside these we find scattered through our Oolitic formations an immense quantity of coral remains. Indeed, if we examine the stones of which some of our most admired churches are built, as at Oxford and Cambridge, we shall find that the firmly integrated mass is little else than shells and corals. Thus the labours of hosts of insect architects, working in the ocean which overflowed this island myriads of ages since, are now employed to form those temples which religion consecrates to the Creator of all things.

The elegance of these fossil remains is still further illustrated

by the three cuts of the *Pentacrinites subangularis*, the sections of the *Pentacrinites dubius*, and of the *Encrinites moniliformis* (Fig. 29).

An examination of the numerous *Cystideæ*—the class of fossils which are allied to the sea-urchins of our own seas—will convince any one of the constant tendency towards the beautiful in all natural objects. The arrangements of the plates of the Cystideans, ornamented as they are with grooves, striæ, and pores, presenting

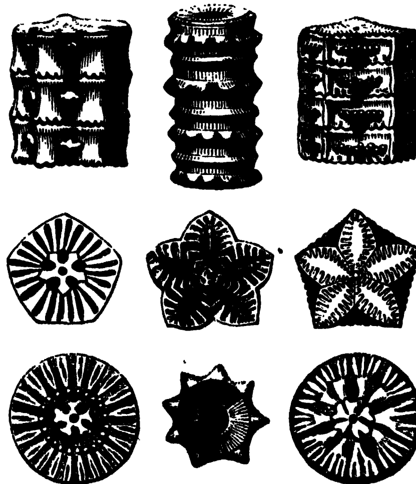


Fig. 29.

a very highly ornamented system of sculpture, cannot be excelled by any imaginary design. The *Echino-encrinites*, with their curious plate ornaments and radiating bands, are all in the highest degree symmetrical, as are also the star-fishes found in a fossil state, and the numerous animal and vegetable remains of a former world, to which we cannot do more than thus cursorily allude. Many hundreds of similar creations possessing the utmost

variety in their arrangements, and rivalling in geometric regularity and beauty the images of the kaleidoscope, are to be found locked within the stony structure of our fossiliferous rocks.

The *Cidaris Blumenbachii* (Fig. 30), found in the Jura, is the

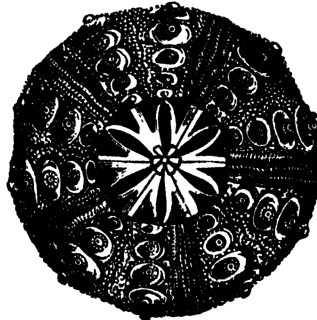
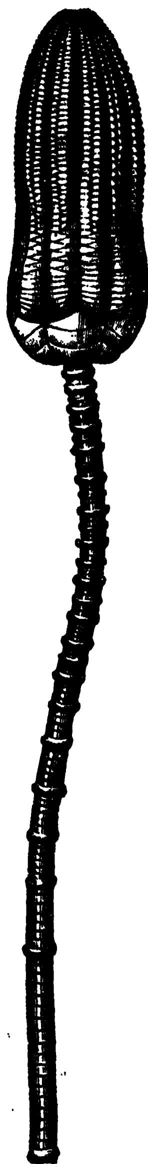


Fig. 30.

only specimen of either of those classes of fossil forms which our space will allow of our giving.

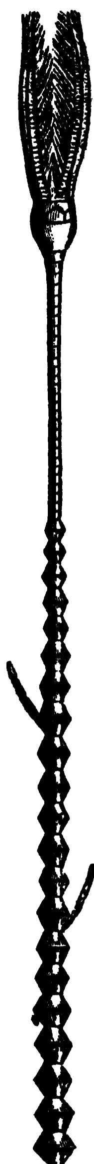
The elegant form of the Lily Encrinites, as they have been called, is well illustrated by the drawing of the *Encrinites moniliformis* (Fig. 31), the sections of the stems of which have been already shown (Fig. 29), and the *Bourgueticrionis crinoidalis* (Fig. 32), which at once unites the perfection of lightness and elegance in the disposition of its jointed stem and its crowning inflorescence. These curious links between the animal and the vegetable kingdoms, presenting in their singularly delicate structures the most desirable forms for ornamental disposition, are to be found in great abundance and diversity.

Distributed through every phase of being, the creations of Nature present a chain, each link of which is symmetrical in form


Fig. 31.

and beautiful in its arrangement. If we commence our examination with these forms of the lowest organization, which appear to mark the dawn of vitality on this planet, and trace series after series through the distinguishing strata—each one marking a new epoch in the order of animal existence, and exhibiting new and constantly varied forms—we shall find that order and elegance mark the whole. Many of those strange creations, the Trilobites—and indeed those monsters of that ocean which appears to have prevailed over the dry land, the Saurians—do not appear, upon the first inspection, to bear out this assertion; but an examination of their wonderful armour will at once show that Nature, in her works, never neglects to add to their adornment after she has provided for the necessities of each condition.

The influence of the study of Nature in refining and purifying the human mind has been often insisted on, and its truth is evident. No effort of human thought, which is of a merely terrestrial character, can ever rise to the truly beautiful. Whether the artist desires to paint upon his


Fig. 32.

canvas, to chisel out of marble, to mould in clay, or to cast in metal, forms which shall possess the charm, the secret of inspiring a feeling of the beautiful, he must go to Nature for his inspiration. Looking into the mirror of her works, like the influence of gazing into loving eyes, he draws from it a pure, a holy inspiration, which he may, if his practised hand be obedient to his creative mind, transfer to the gross element which is to express to mankind the power of the true.

Persuaded that but few of those who are engaged on works of art or of art-manufacture have had their attention directed to any of the results of palæontological studies, and feeling confident that an immense store of novelties was to be found amongst the fossil remnants of those days when man was not, the remarks now submitted for their consideration, with every feeling of their imperfections and necessarily sketchy character, will not, it is thought, be without interest.

While dealing with the applications of science to the economic purposes of life, it was thought that a step beyond this mere utilitarian purpose might be allowed, and that the studies of the natural philosopher might be made to minister to the

> "Spirit of Beauty, that does consecrate
> With its own hues all that it shines upon
> Of human thought or form."

These essays were produced twenty-four years since. They were written to serve a special purpose—the subject of art manufacture; being, in 1848, one which was engaging general

attention. With a few verbal corrections the essays remain in the condition in which they were first published. They indicate, however—and they aim at nothing more—with sufficient clearness, a source from which the ingenious artist might multiply his forms for ornamentation. It must not be forgotten that during the past twenty-four years the science of geology has achieved wonders, and the cabinets of the palæontologist have been crowded with the most beautiful forms of organic creation. If *then* there existed a store of choice and rare forms, these are multiplied by thousands *now*.

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